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Gradus ad Aornon.—By Major J. ABBOTT.

Of all the sites mentioned by the historians of Alexander, none has excited deeper interest, none has so entirely defied research, as the celebrated Rock Aornos;* that Rock which having thrice resisted the assaults of Hercules, yielded to the superior skill and indomitable courage of the son of Philip. Yet there is no site which seems so well defined by local peculiarities, none which at the outset a traveller would so confidently calculate upon identifying.

The author† of the best English history of Alexander thus confidently disposes of the question: “It is on the right bank of the Indus, close to the river. A traveller going up the right bank could not fail to find it.”

Acting upon this suggestion or guided by more direct reference to ancient authors, Edward Conolly, in A. D. 1839, ascended the right bank of the Indus as high as Umb, at that time in possession of the celebrated Poynda Khan, whose possessions Cis-Indus had been wrested from him by the Sikhs. He, being brother-in-law to Sir W. McNaghten our Cabul Envoy, had with him a Tosha Khaua, and the distribution of handsome presents made him a welcome guest upon that border.

It is curious at this day to hear those who received him, relate the impressions left by the first Englishman that had ever been seen in that country.

* We have, I believe, no means of ascertaining whether this name was Aornos or Aornon.

† The Rev. Mr. Williams.

Edward Conolly (brother of the traveller and martyr Arthur Conolly, whose name must ever be mentioned with reverence) was an enthusiastic antiquary. He possessed an excellent and choice library and had means of access to the Greek and Latin historians without aid of translations. His industry and enthusiasm, however, seem to have availed him little in the quest of Aornos. He may have made guesses, but it is certain that he did not see the Rock Aornos which "is so easily found by any traveller who proceeds up the right bank of the Indus." He may probably have been struck with the name Umb* as the first syllable of that Umb Balimah where Alexander fixed his camp for the attack of Aornos. But it is improbable that Balimah, which is invisible from Umb, should have been discovered by him.

Another English traveller Capt. Leach† followed Edward Conolly's steps a year or two after him. He was probably more general in his enquiries. He met with the same attention as Conolly: but, if either had purposed proceeding higher up the Indus, he found on enquiry that such a step would be madness.

Vigne had come to Torbaila and had been struck with the name of Umb, but failed to discover its adjunct Balimah. Being a liberal-minded man, he allows his reader the choice of many sites scattered over the Eusufzye, the Wuzzeeree country, and the Punjaub even to Iskardoh beyond Cashmere. If in so ample an area, filled with rugged rocks and impregnable fortresses, no Aornos worthy of Hercules and Alexander is to be found, we hold the case to be indeed hopeless.

Now, it is very certain, that if Curtius's history be a faithful narrative of Alexander's movements, Mr. Williams' directions for finding Aornos are infallible. For since the assailants were hurled from the rock into the Indus, the rock must have beetled over the right bank of the river. Yet, not only Conolly, Leach and Vigne have failed to discover any such rock answering to the description

* The name Umb seems to have struck several travellers. Genl. Court is, I believe, the first who observes upon it: Vigne the second.

† I write this name with some hesitation from memory, having forgotten to make a memorandum of it when the certificates given by this traveller to Poynda Khan were brought to me.

of either of the historians, but other officers have for years scrutinized the rocks on the right bank of the Indus with like disappointment. It may be well therefore to enquire wherein the difficulty lies.

Of all the histories written by ancient authors of Alexander's conquests only two* remain. The "Anabasis" of Arrian and the "Exploits of Alexander" by Curtius, the first written 460 years, the second 400 years after the death of Alexander. The contemporary history of Ptolemy, the companion of Alexander, is lost for ever, so are the Journals of Alexander's Quarter Master General† Bæton and of Diognetus. Another life of the king written during his reign was destroyed by him for its fulsome flattery. The Journals of Onesicritus are lost, excepting some scattered fragments quoted by other authors.

Now, if the two extant histories agreed in local description, we might confidently take the guidance of either. But this is not the fact, and in no case are the discrepancies so great, as in the several descriptions of the Rock Aornos. It becomes therefore necessary to make our choice: to follow the one, and either to reject the other or to use it as a commentary. Where such necessity exists, few will hesitate to prefer the matter-of-fact history of Arrian to the more romantic narration of Curtius; the first being the work apparently of a cool investigator well versed in geography and in military tactics; whilst the beautiful language and vivid descriptions of Curtius are often the whole merit of his work.

This plan I purpose pursuing in my quest of Aornos. Arrian is the text, Curtius and Strabo are the commentaries. Curtius can often, and Strabo may sometimes, supply hints omitted by Arrian. All had access we may presume to Ptolemy's authentic history.

In commencing this search, it is necessary to start from some point, the general locality of which is beyond question. Let us take for this the Alexandria *εν παραπαμισαις*. Whether this be Begh-rám‡ near Cabul or Istalif is immaterial at present, since the route from either to India is the same.

Leaving Alexandria in Parapamisis, Alexander marched to the

* I do not mention Plutarch's account, which is a sketch rather than a history.

† See Pliny, Book VI. p. 125, D. Holland's translation.

‡ Vihgraon, an excellent city; or Veuggron, a difficult city.

city Nikaia and there sacrificed to Minerva. Then he advanced to the river Koopheen, sending heralds to Taxiles and those bordering the Indus, commanding them to meet him on his advance.

It is very important to identify this Nikaia, of the name of which all traces seem to have disappeared from the country. Fortunately the travels of the Chinese Hiuan Tsang supposed to have been made in the 6th century of our era, throw some light upon the locality. In the Journal of this Society, we have two commentaries upon these travels, the one by Major W. Anderson, the other by Capt. A. Cunningham.

This traveller entering India from Cabul passes Lanpho, which both commentators identify as Lumghaun. Thence passing South-East a great chain (of mountains) for the distance of 100 Li (or 17 miles) he arrives at Na,ko,lo,ho—the Northern limit of India, on all sides girt with mountains, and having three stoupas or topes, two the work of Asóka.

This place Major Anderson identified with Nungnuhar, the ancient name of the Julalabad district, and Capt. Cunningham identifies it with the Nungnihar, or Nagara or Dionûsopolis of Ptolemy and the Nusa of Alexander's historians. Now the Nusa of Curtius had tombs of cedar and was colder than other places passed by the Macedonians who had just surmounted the snowy ridge of Paropamisas. It is certain that cedar groves could never have flourished in the valley of Julalabad where the hot winds blow, and that Jullalabad must have been the hottest spot yet found in their route. Alexander, according to Arrian, came to Nusa after visiting Peshawur and the Indus and after the capture of Aornos. The site of Julalabad will therefore answer neither historian's account of Nusa. But in the name Nungnihar we have undoubtedly the Nikaia of Arrian, where Alexander halted to sacrifice to Athene, and the Fines Indiæ of Curtius, where on his arrival the border Chiefs and Princes thronged to worship him as the third of the sons of Jupiter who had come amongst them.

Julalabad is the natural halting and refreshing-place of all armies marching from Cabul to Peshawur. Here they recruit their supplies. Here in the open valley they can suffer their cattle to graze without fear of losing them. It is the limit also at which met in

former days the Indian race and the races of Khorussaun,* and was the point at which Sooltan Maimood first encountered an Indian Army. The predominance of the Western races since the reign of Maimood has driven back the Hindoo tribes to within the boundary of the Indus. The robust race of Afghan and Asuf, transplanted to the mountains of Ghor by the conqueror Nabukht nasir seem easily to have mastered for themselves all the more rugged tracts, and to have driven out from the valley of Sohaut, or there to have reduced to entire subjection, the softer races of the East, even so early as the day of Alexander. But on the other hand, the greater wealth of India and the heroic courage of the Rajpootre tribes enabled them to maintain their empire wherever the climate was congenial to their constitution, or the surface suited to the evolutions of their cavalry.

I know of no place in the route of Alexander better indicated by local peculiarities and ancient name than the site of this Nikaia. Nungnuhar or Julalabad was a convenient spot from which to send heralds to the Indian tribes, as he could there entrust their safe conduct to Indian chiefs and princes.

Leaving Nikaia, Alexander advanced to the Koopheen river. No river had as yet been crossed, therefore no river is mentioned in the route, although there flowed upon his left hand the various mountain streams which united to the Cabul river form, at Julalabad, the Nagooman. These streams and the countries they water, could have had no attraction for Alexander: and to have involved himself in a campaign among mountains so worthless and so rugged, would have necessitated the deferment of his Indian expedition for another season. The river Koopheen *κωφην* being the first mentioned in the route is of much importance as a landmark.

We have seen that the united streams of the Cabul river, the Punjsheer, the Mingar, the Alishung and Kooner become at Julalabad the river Nagooman. In like manner the river Punjgowra and the Sohaut Sinde uniting in Sohaut there bear as one, various new names, according to the towns near which they pass or to the country they water. The names are Sohaut Sinde, Punjgowra.

* Khorussaun is the old name of all Afghanistan, which formed the Eastern province of Persia.

Ashtnugr kè qwur, Abazye kè qwur, &c. The word Qwur signifying in the language of the country (viz. the Pushtoo), a river. The origin of the name Koopheen is manifest in the existence near the confluence of the Punjgowra and Sohaut Sinde of the site of an old town called to this day Koofa. The Koopheen was the river nearest to the Indus on the Western side; for, after the capture of Aornos, Alexander went through the Doaba of the Indus and the Koopheen. The modern name Loondi or Lundi (signifying the Short) seems to have been unknown at that time. It applies at present only to the united streams of the Nagooman and Sohaut Sinde from their junction to the Indus. And it appears to me that this portion only was called by the Greeks Koopheen.

I purpose giving the route as detailed by Arrian and by Curtius in parallel columns condensing the relations of military operations, so as to interrupt as little as possible the chain of localities.

Arrian.

And coming to the city Nikaia and having sacrificed to Athene, he advanced to the river Koopheen, sending on an ambassador to Taxiles and those bordering the river Indus, commanding them to meet him on his advance. And Taxiles and the other Uparchs* meeting him presented gifts, the greatest sanctioned by the Indians, and promised to bestow the elephants in their possession to the number of twenty-five. Then dividing the army he sent Hephaistioon and Perdikkas to the country of Peukela (Pekawur) and even to the river Indus, having the corps of Gorgios and Kleitos and Meleagros and half the companion horse and the

Curtius.

Alexander having entered the confines of India, the princes of the nations hastened to execute his commands declaring him to be the third descendant of Jupiter who had appeared amongst them. That Father Bacchus and Hercules were known to them by tradition, but that he was visibly present to their senses. The king commanded them, whom he had benignly received, to follow him, being about to employ them as guides in his progress. When they ceased to arrive he sent in advance Hephaistioon and Perdikkas with a portion of the army to subdue those who should refuse his government, and to proceed to the river Indus, and there

* Taxiles, we see, was one of several Uparchs on the borders of the Indus.

Arrian.

whole of the mercenary horse ; instructed to seize by force the places on their road or to reduce them to surrender : and on their arrival at the Indus, there to make all arrangements necessary for the passage of that river. With them were sent Taxiles and the other Uparchs. And they, on arriving at the Indus, arranged all this as directed by Alexander. But Astes, Uparch of the country of Peukela mutinying, was killed, and the city was destroyed. For the force of Hephaistion investing it reduced it in thirty days, and Astes himself was slain and Suggaios was ordered to take charge of the city. He had formerly fled from Astes and found refuge with Taxiles, and this formed Alexander's assurance of him.

But Alexander leading the shield-bearers and as many of the companion horse as had not been ordered to accompany Hephaistion and the corps of those styled foot companions, and the archers, and the Agrians and the mounted Javelineers, advanced against the countries of the Aspasioi and of the Gouraioi and of the Assakanoi skirting the river called Khoés* (or Khoeë or Khoa,) a

Curtius.

build boats by which to waft his army to the farther bank. They, because many rivers were to be crossed, so fitted together the vessels, as that they might be taken to pieces and being carried on waggons, be again put together. He ordered Craterus to follow him with the phalanx, and himself led the Horse and the Light Infantry, and drove together into the neighbouring city in a skirmish those who opposed him. After him followed Craterus, and that the nations unused to Macedonian warfare might be at the outset terror-stricken, he forbade that quarter should be given, burning the defensible cities which he had besieged. And whilst riding before the walls he was wounded with an arrow. He, however, took the town and having murdered all the inhabitants raged against the roofs. Thence having conquered an obscure people he arrived at Nusa. It chanced that the camp being pitched before the very walls in a woodland spot, the chill of the night there afflicted the body more than usual and that recourse was had to fire. Wherefore the woods being felled they set them on fire. The flame

* Having this name only in the accusative, we cannot certainly determine the nominative. If it were Khóa we should have the word Khwur, the general name for a river in that country to this day.

Arrian.

mountainous and rugged road,* and having with difficulty passed it, he commanded the throng of foot to follow step by step. But he, taking all the horse, and of the Macedonian foot 800, caused the heavy armed foot to mount on horseback, and pushed on rapidly, because he had heard that the neighbouring barbarians had fled to the mountain of that country and to defend such cities as were tenable. And attacking them at the first inhabited city on the road, those arrayed in front of the walls fled on the first assault and shut themselves within the city."

This city had a double wall, Alexander and Ptolemy were wounded before it. It was taken the day following, the inhabitants flying to the mountain which was near the city.

"Having levelled this city he came to Andaka, another city, which having entered on its surrender, he occupied: he left Krateros with the other foot commanders, to take forcibly any cities not voluntarily surrendering and to arrange all matters in

Curtius.

spreading enveloped the tombs of the citizens. They were of ancient cedar and, taking fire, spread widely until the whole was levelled with the soil. And from the city first the bark of dogs then the murmur of men was heard. And then the citizens perceived an enemy and the Macedonians that they were before the city. And now the king led up his forces and besieged the city, when those of the enemy who tried conclusions were overwhelmed with darts. Therefore some tried surrender, others fight: their difference being known, he commanded to surround those who hesitated and to abstain from slaughtering them, and at length wearied with the evils of a siege they surrendered. They gave out that they were founded by Father Bacchus and this was their real origin. The city is founded beneath the roots of the mountain which the inhabitants call Meros: whence the Greeks have drawn the license of fabling that Father Bacchus was hidden in the thigh of Jupiter. The

* There seems to be here some misprint. The text has *πορεύθεις δε παρα τον χοην καλουμενον ποταμον, ορεινην τε οδον και τραχειαν, και τουτον διαβας χαλεπως*. Had it been *την* there had been no doubt that it was the road which he passed with difficulty but the masculine gender has led Rooke in his translation (which I have procured to compare with my own) to translate it, "when he had with some difficulty crossed that river." It seems to me more probable that Arrian wrote *ταυτην*.

Arrian.

that district according to their judgment.

“xxiv. But he, leading the shieldbearers and the archers and the Agrians and the corps of Koinos and Attalos, and the squadron of horse and more than four Hipparchs of the other companions and half the mounted archers, advanced to the river Euaspla, where was the Uparch of the Aspasioi and, having passed over much ground, the next day approached the city. But the barbarians, perceiving his approach, set fire to the city and fled to the mountain.”

Many were slaughtered ere they could reach the rugged country, and Ptolemy, seeing their leader on a hill, attacked and slew him, and spoiled him after a hard contest for the body: overpassing the mountain, Alexander arrived at a city called Arigaios or Arigaion. “There also the army of Krateros rejoined him, having fulfilled all the king’s commands. And he directed Krateros to re-people that city which he deemed convenient for a colony with volunteers of that neighbourhood and with the sick of the army.”

He then pursued the fugitives and encamped at the foot of the mountain which they occupied. And Ptolemy, being sent to forage,

Curtius.

king ascertaining the situation of the mountain from the inhabitants, having sent on refreshments climbed to the summit. Many ivies and vines are produced throughout the mountain, perennial springs abound. The juices of the fruits also are various and wholesome, the earth fostering the fruits of chance sown seeds. Laurels also and berries and much rural wood are found in those rocks. I think indeed that moved by no divine impulse but by wantonness they wandered through that grove, crowned with ivy and vine leaves like Bacchannals. The mountain ridge and hills resounded with the voices of the many thousands adoring the presiding deity of that grove. Then licence arising as generally happens, spread throughout the whole band. For in mid-march they prostrated their bodies upon the grass and gathered boughs. And the king not averse from casual indulgence, feasted, abundantly, the whole band, devoting the army for ten days to the service of Father Bacchus, &c.

Thence he arrived at a region called Dædala. The inhabitants quitted their dwellings and fled together to the pathless and

Arrian.

sent report to Alexander that the fires of the enemy exceeded those of their own camp. Alexander leaving a party to protect his camp led up his force in three columns upon the enemy. Ptolemy again had to attack a force upon a hill. After much fighting the enemy were routed leaving 40,000 prisoners and above 230,000 oxen, of which Alexander selected the strongest to send to Macedonia to till the land.

“Thence he came into the country of the Assakenoi, for he had heard that they had made the most warlike preparations, having 20,000 horse and above 30,000 foot and 30 elephants. Krateros having already fortified the city, to build which he had been left behind, brought up to Alexander the heavier armed of the force, and the War engines in case they might be wanted for a siege. But Alexander, leading the companion horse and the mounted Javelineers and the corps of Koinos and of Poluperchos and the Agrians, a thousand strong, and the archers, came against the Assakenoi. For he went through the country of the Gouraioi and with difficulty passed the river (called after the country Gouraios) on account of its depth, its vio-

Curtius.

woody mountains. Therefore he passed Acadera alike deserted of its inhabitants by flight. Therefore necessity altered the form of warfare. For dividing his forces he appeared in arms at many points at once. And all who awaited the enemy, overwhelmed, were conquered with like slaughter. Ptolemy took more, Alexander larger cities; and again he re-assembled his divided forces. Then the river Choaspis being past he left Cœnos (Koinos) to besiege an opulent city (the inhabitants call it Bezira) he himself came to Mazaga. Assakenos, whose kingdom it was, having lately deceased, his mother (perhaps the child's mother is meant) Cleophes, presided over the country and the city. Thirty thousand foot held the town, protected not only by its position but by art also. For where it faces the East it is girt with a torrent, which with its precipitous banks impedes access to the city. On the West and South, as if by art, nature has piled up towering rocks, below which caverns and chasms, worn by ages, yawn to great depth: and where they cease, a ditch of mighty labour interposes. A wall of thirty-five stadia ($4\frac{1}{2}$ miles) encloses the

Arrian.

lent current, and that round boulders in the river were dangerous to those fording. But the barbarians learning Alexander's approach, not having courage for a pitched battle, distributed themselves amongst their several cities, purposing to defend them.

"xxvi.—And Alexander came first to Massaga the largest of those cities."

The siege of Massaga occupies two pages. The enemy had 7,000 mercenary troops of the neighbouring districts (the Rohillas, probably, who still swarm in that neighbourhood). These sallied bravely upon the Macedonians as they were encamping. Alexander feigning to retreat, drew them away from the city to an eminence. Then suddenly turning back upon them, routed them and drove them back to the town, leaving 200 slain. Alexander at once closed upon the walls and rained in arrows and, easily advancing his engines to the base, effected a partial breach that day, which, the Macedonians carried but could not retain. The third day he dropped a bridge from the engine upon the wall, but it broke beneath the impetuous rush of his soldiers and many of them were killed. Another bridge was pre-

Curtius.

city; its base of stone, its superstructure of unburnt brick. Stones brace together the bricks, interposed that the softer may rest upon the stronger material, when the soil is flooded with moisture. That nothing might be wanting, strong beams are superadded, upon which planks being fastened, not only cover the walls, but render them pervious. Alexander contemplating these defences and at a loss, because the chasms could be filled with nothing less than a hill, nor without filling them could he advance his engines to the walls, was wounded by an arrow from the wall. The arrow lighted upon his thigh and the head being plucked out he ordered them to place him in his saddle, sitting in which he continued the operations without attending to the wound. After awhile, when the leg hanging down and the blood drying, the wound in cooling aggravated his pain, he is reported to have observed, that he was styled son of Jupiter, yet felt the evil of a body subject to pain. Nevertheless he no sooner found himself in camp than he oversaw all things and dictated his commands. Therefore because it was so ordained, some pulled down the suburbs and

Arrian.

pared, but the enemy still resisted stoutly. Eventually however, their leaders being killed they, after a vigorous defence, sent heralds to Alexander. Alexander granted them terms on condition that the mercenaries should take service under him. This they accepted, but, encamping apart upon a separate eminence, in the night prepared to fly, being too honorable to bear arms against their own countrymen. Alexander learning this, destroyed them in the act of flight. He deprived of all its defenders the city captured by force. The mother of Assakanos and her son were taken. Alexander lost in all this siege only twenty-five men.

“Thence he despatched Koinos to Bazira, being of opinion that the Baziroi on learning the destruction of the Massagoi, would surrender of their own accord. But he sent Alketos and Demetrios the Ipparch to Ora another city, commanded to enclose the city in a wall until his arrival. And the citizens sallied upon Alketos’s force. The Macedonians, however, without difficulty drove them back into the city. And the contest with the Baziroi did not advance under Koinos, for trusting to the great

Curtius.

dragged along mighty heaps of material for a mound. Others cast into the cavities the roots of large trees and rocks to swell the heap. And now the pile was level with the earth’s surface. Therefore they erected the turrets, which works were completed by the ardor of the troops in nine days. The king, with his wound still green, went to inspect the works, and, having praised the soldiery, ordered them to advance the engines, from which a mighty flight of darts is cast upon the defenders. But especially the moving towers terrified men unused to such a sight: that such vast masses should be brought up without visible aid, they believed to be through the agency of the gods. The battering-rams also and the massive darts launched from the engines, seemed unsuited to mortals. Therefore hopeless of saving the city, they retired to the citadel. Whence, since nothing but surrender would serve, their ambassadors waited upon the king to implore pardon. Which gained, the queen with a large concourse of noble women, went in procession, pouring out wine from golden goblets. She, placing her young son at the knees of the king, not only pro-

Arrian.

strength of the place, for it was upon a hill and completely fortified, they would not come to terms of surrender. Alexander knowing this, marched for Bazira. But knowing also that certain of the barbarians of the neighbourhood had found admittance to the city Ora, intending to hide there, being sent by Abisares, he came first to Ora. He ordered Koinos to invest with walls the city of the Baziroi, a place of strength leaving in the works a garrison sufficient to prevent those in the city from having confidence to attack the works, but he, leading the remainder of the troops, was to come to Alexander. And they of the Baziroi, seeing Koinos departing with the bulk of his army and despising the Macedonians as unworthy to meet them in battle, sallied out into the plain, and there commenced with them a stout battle, in which the barbarians lost five hundred men, and of them were taken alive seventy. The remainder, flying together into the city, were there shut up more strongly in

Curtius.

cured pardon but even the grace of his former fortune : since she is called queen : and some believe, that the grace was accorded rather to her beauty than to her misfortunes. Certainly she afterwards bore a son, however begotten, whose name was Alexander.

11.—Hence having sent Polyperchon with an army against the city Ora, he conquered the rude citizens in battle and having followed them, driven within their defences, reduced the city to surrender. Many obscure towns, deserted of their inhabitants came into the power of the king, whose armed inhabitants occupied a rock called Aornos, which tradition reported to have been besieged in vain by Hercules and to stand apart upheaved by earthquakes.* A certain elder well acquainted with the locality, approached Alexander, who was at a loss how to proceed (because the rock was on all sides broken and precipitous) promising for a reward to show him access to the rock. Alexander promised him eighty talents and retaining one

* This passage “Hanc (i. e. petram) ab Hercule frustra obsessam esse, terræque motu coactum absistere, fama vulgaverat” is obscure—the word *coactum* agrees neither with *Hercule* nor with *petram*. I should suggest its being made *coactam*, which reconciles the difficulty ; and after consideration I have adopted this reading. Our respect for Hercules would not improve, could we think him to be frightened by an earthquake.

Arrian.

the wall of investment. And the siege of Ora became easy to Alexander. Indeed attacking the walls by assault, he mastered the city and took the elephants that had been left behind.

xxviii.—And they of the Baziroi, when they heard this, despairing of their own cause, deserted the city at midnight. They fled to the rock as did those other barbarians. For abandoning all their cities they fled to a rock in that country, called Aornos. For this mighty mass of rock is in that country and tradition relates concerning it, that the rock remained impregnable to Hercules the divine. Whether indeed the Theban or Tyrian or Egyptian Hercules came to the Indus, I affirm not, I am inclined to think that he came not. But whatsoever things are difficult, men, to enhance the difficulty, fable them to have been impracticable to Hercules. And concerning this rock, I know not that it is numbered by tradition amongst the labors of Hercules. The circuit of this rock is rated at upwards of 200 stadia (14 miles). The altitude above the

Curtius.

of the sons as a hostage, dismissed him to make good his offer. Mulinus, the king's secretary, was placed in command of the light-armed. He thought fit to plant them on the mountain crest by a path which might baffle the enemy's vigilance. This rock does not, like most rocks, terminate by gentle slopes in a lofty pinnacle but is set up, most like a goal, whose base is broader, whose higher portions are more restricted, whose summits shoot into a sharp peak. Its roots the Indus enters scarped on both sides with lofty rocks: on the other hand were interposed gulfs* and quagmires, nor was there any way of assailing the rock but by filling them. A forest was at hand, which the king ordered to be felled and that the naked trunks should be cast in, because the branches clad with leaves impeded those bearing them. He himself cast in the first trunk, and the shouts of the army an index to their alacrity followed; none grudging the labor, because the king shared it. They filled the cavities by the seventh day, when the king ordered the archers and the Agrians to struggle

* Eluvies is the word. If quagmires were to be filled up, the rock Pehoon must be Aornos. There is no other on the Indus requiring such an expedient. I have translated Voragines, gulfs, as leaving their nature in uncertainty.

Arrian.

earth's surface at 11 stadia (4125 feet) and the ascent very difficult even with aid of the hands, and there is abundance of water at the summit of the rock, and pure springs are welling, so that the water overflows, and wood and good soil abound, sufficient for a thousand men, should they cultivate. And Alexander hearing these things was seized with the desire to capture also that *mountain*, not the less on account of the fables related of Hercules. He established garrisons in Ora and Mas-saga for that country and secured with a wall the city Bazira. And the force of Hephistiion and Perdikkas, walling another town (it's name was Orobatis*) and leaving in it a garrison, came even to the river Indus, that they might on arrival there, prepare means of bridging the river Indus as ordained by Alexander. But Alexander appointed Nikanor of the companions Satrap of the district bordering the Indus. He had come first to the river Indus and had got possession by surrender of the city Peukela, sited not far from the river Indus and had appointed in it a Macedonian garrison and Philip, governor of the garrison. But he subdued

Curtius.

through the difficulties, and selected thirty of the most courageous youths from his own cohort. Over them, he appointed Charus and Alexander, whom the king reminded of his name as being common to both. And at the outset on account of the imminence of the peril, it did not please that the king should be engaged. But when the trumpet sounded, being a man of heady valor, he turned to his guards and ordering them to follow him, first attacked the rock. Nor after that did any Macedonian hold back, but, quitting their several posts, voluntarily followed the king. Wretched was the case of many whom the river sucked in as they fell from the broken rocks, a sad enough spectacle even for those not endangered: but when they were admonished of their own peril in another's destruction, pity being converted into fear, they wept, not the defunct, but themselves. And now had they attained to where they could retire without destruction only as victors, the barbarians rolling down huge rocks upon their approach, with which being struck they fell headlong from their unstable and slippery footing. Alex-

* The ruins of Arabut are still seen on the Loondi left bank near Nowashihr.

Arrian.

other small towns built on the river Indus. Kophaïos and Assogetes, Uparchs of the country attending him. And coming to the city Embolima, sited near the rock Aornos: Krateros was left by him with a portion of the army to collect into the town much corn and other commodities suitable to a prolonged delay, that the Macedonians sitting down might weary out the defenders of the rock with a lengthened siege, if they could not carry it by assault. But he, taking the archers and the Agrians and the corps of Koinos, men selected from the other phalanx for their activity and perfect equipment and 200 of the companion horse and 20 of the mounted archers, approached the rock and that day encamped where it appeared to him convenient, on the morrow advancing a little, even to the rock, he again encamped.

xxix.—And certain of the neighboring inhabitants, there, approached him, and, surrendering themselves, offered to lead to an assailable point of the rock, whence it would not be difficult for him to take the place. And with them he sent Ptolemy son of Lagos, the life guardsman, leading the Agrians and the other light armed and the selected or

Curtius.

ander and Charus however, escaped, whom the king had sent in advance with the thirty selected youths and now began to fight feebly. But as the barbarians hurled their darts from above, they were oftener stricken than they struck. Therefore Alexander mindful of his name and promise, whilst fighting rather fiercely than cautiously, being pierced through was overthrown. Whom when Charus beheld extended, he rushed upon the enemy forgetful of all but revenge, and slew many with the javelin, some with the sword. But, since so many were opposed to one, he soon lay lifeless upon the body of his friend. The fight was very unequal, the king moved by the destruction of his bravest youth and other soldiers, gave the signal for retreat. It proved their safety that they retired gradually and intrepidly: and the barbarians satisfied to have repelled the enemy, did not press upon them as they retired. But Alexander when he had determined to abandon the enterprize (since there was no hope of seizing the rock) nevertheless made a show of persevering in the siege. For he ordered the passes to be closed and towers to be brought up and

Arrian.

the shield-bearers; instructed that on taking the place they should hold it in force and should signal that they possessed it. And Ptolemy threading a rugged and difficult path, escaped the notice of the barbarians holding the country, and fortifying it by a circular palisade and ditch, lighted the beacon upon the mountain; that it might be seen by Alexander, and it was seen by its flame, and Alexander next day advanced the army: but the barbarians opposing him, he did not advance far on account of the steepness (of the hill). But when the barbarians perceived the ascent to be impossible to Alexander, they turned upon Ptolemy's force and attacked it, and between them and the Macedonians a stout battle was maintained, the Indians earnestly endeavoring to tear up the palisade, Ptolemy to defend the post. And the barbarians losing victims in the skirmish, at night fall retired. Alexander selecting certain of the Indian deserters of whom he held security, sent the Indians by night to Ptolemy bearing letters. Thus it was written. "Whenever he himself (Alexander) should attack the rock, he (Ptolemy) should come down upon the barbarians

Curtius.

fresh troops to succeed to the wearied. Which pertinacity being observed, the Indians for two days and two nights banquetted with ostentation not only of confidence, but of victory, beating drums according to their custom. On the 3rd night however, the sounds of the drums had ceased to be heard, and torches glowed over the whole rock which the barbarians were lighting that their flight in the darkness of night over pathless rocks might be secured. The king having sent Balacros to reconnoitre, knew that the rock was deserted by the flight of the Indians. Then at a given signal as they shouted all together, Fear struck the fugitives in their disorder and many, as if close prest by the enemy, precipitated themselves over the slippery rocks and pathless crags. More, mutilated in some member of the body, were deserted of the unwounded. The king victor rather of the place than of the enemy, nevertheless offered thanksgiving to the gods and sacrifices as for a great victory. Altars were built on the spot to Minerva and to Victory. To the leaders of the enterprise whom he had ordered to mount lightly armed he rendered the promised reward with fidelity, although

Arrian.

on the mountain, not being contented to guard the post: the Indians being thus attacked on both sides would be perplexed." And he at day break (5th morning) having got under arms from camp, led on the army to the ascent by which Ptolemy had climbed unseen; being of opinion, that if thus ascending he could form a junction with Ptolemy's force the work would be far from difficult to him. And thus it proved, for at mid-day ensued a stout battle between the Indians and the Macedonians, these endeavoring to force the ascent, those striving to hurl them back. And when the Macedonians were not prevented, one succeeding another whilst the foremost refreshed; with difficulty toward the cool of the day (evening) they mastered the passage and formed a junction with Ptolemy's force. Thence when the army were come up, he again led them to that rock, for the ascent was still difficult. The same day however, he completed his object, on the morning (6th) he allotted to each camp to cut palisades a hundred per man: and they were cutting them and he raised a mound commencing on the crest of the ridge where they were encamped even to the rock, a large mound (or trench) thence it seemed to him possible to reach the defenders with his arrows, and the darts might be hurled from the engine. And they dug for him, each working in turn, and he stood a witnesser and praiser of that performed with enthusiasm, but the prompt chastiser of neglect.

Curtius.

they had somewhat failed of their engagement. The government of the rock and of the adjoining region was made over to Sisocostos. 12. Thence he proceeded to Embolima, and when he discovered that the straits of his road were beset by one Eryx with 20,000 armed men, he made over the heavier battalion of the army to Cœnus to be led by gentle marches, whilst he, advancing with the slingers and archers, drove out those who beset the forest and opened a road to the army following him. The Indians, whether of hatred to their leader or to curry favor of the conqueror king, attacking the flying Eryx, slew him and brought his head and his arms to Alexander. He gave impunity to the deed, but denied honor to the example. Hence he arrived at the Indus in sixteen marches and found all prepared by Hephaistion for the passage according to his orders.

XXX.—On the 1st day, the army dug for him about a stadion. On the morrow (7th) they slinging at the Indians from the mound already raised, and the darts being launched from the engine, repelled the sallies of the Indians upon the diggers. And in three days they dug for him even to the works, (end of 8th) on the 4th day (9th)* a few of the Macedonians gallantly carried a small hill, even with the rock, and Alexander, on the alert, advanced the trench, purposing to connect it with the hill which those few already held for him. But the Indians astounded at the unparalleled audacity of the Macedonians carrying the hill, and already beholding the mound united (to it) abstained from defending themselves, but sending their heralds to Alexander, expressed their readiness to surrender the rock, if he would make a covenant with them. He suspected that they were wearing out the day in negotiations, that at night each might flee to his own. And when Alexander perceived this, he gave them time for the flight, and removed the guards posted around them. And he waited until they should commence their flight, and at that moment taking 700 body-guard and of the shield-bearers to the adventure of the rock, himself first ascended it, and the Macedonians, hauling up one the other, ascended in succession. And they routing the departing barbarians at a signal, many were slain in flight, and the fugitives being terrified threw themselves down the cliffs and perished. The rock thus came into the hands of Alexander which had remained impregnable to Hercules. And Alexander burnt incense upon it and appointed a garrison, entrusting to Sisicostos the superintendence of the garrison, who from the Indians had heretofore behaved bravely against Bessos. And Alexander occupying the Baktrian country campaigned in his company, and this appeared a pledge for the best. Quitting the rock, he invaded the country of the Assakanoi. For he had heard that the brother of Assakanos, having elephants, and many of the neighbouring barbarians had fled together to that mountain. And coming to the city Durta he (found) none

* Rooke in his translation thus renders the passage: "But on the fourth, when some Macedonians had begun to build a mound opposite to the rock which was designed to be of equal height therewith." I prefer my own translation. The reader may judge for himself: Arrian says *τη τεταρτη δε βιασαμενοι των Μακεδωνων ου πολλοι κατεσχον ολιγον γηλοφον ισοπεδον τη πετρα*. Lib. IV. ch. XXX.

of the inhabitants there, nor in the country about the city. On the morrow he sent Nearchos and Antiochos, Chiliarchs of the shield-bearers, and commanded Nearchos to lead also the Agrians and the light-armed. To Antiochos (he gave) his own regiment and two others with it. He sent them to explore the country, and if possible to seize a few of the inhabitants, from whom he might learn particulars of others of that country and especially of the elephants. But he then came to the river Indus. And the army made for him the road in advance: that country being otherwise pathless. There he seized a few of the barbarians and learnt from them, that the Indians of the country had fled to Abisares, but had left the elephants to feed at the river Indus, and he ordered them to lead the way to the elephants. There are many Indians, hunters of elephants, such Alexander immediately summoned around him and hunted the elephants with them. And two of the elephants were killed, having fallen from the cliffs during the chase. But the rest being captured were brought mounted, and were incorporated with the army. And because timber susceptible of being wrought, grew upon the river, he made the army fell it and built boats, and they* were brought upon the river Indus even to the bridge which Hephaistion and Perdikkas had already made.

LIB. V. CAP. 1ST.

Alexander went through all the country which lay between the Koopheen and Indus rivers and where the city Nusa is said to be built being founded by Dionusos, &c. &c.

And when Alexander arrived at Nusa, the Nusaioi sent him their chief (named Akouphis) and thirty elders, the most esteemed, with him, imploring Alexander to release the city for the sake of the god. The elders having entered Alexander's tent and having surprised him dusty with travel, sitting clad in his other arms, his helmet

* Rooke in his translation thus renders the passage "*which (the vessels) being launched into the river he and his forces were thereby conveyed to the bridge.*" Of this passage all the words in Italics have no corresponding Greek words according to my edition of Arrian, who says simply *και ναυς εποιησαν, και αυται* (i. e. the boats which are feminine) *κατα τον Ινδον ποταμον ηγοντο ως επι γεφυραν*. Lib. IV. ch. XXX.

lying beside him and his hand grasping a spear were amazed at the sight and falling to the earth long held silence. But when Alexander signed to them to rise and commanded them to take confidence, Akouphis thus begun :

O king, the Nusaioi entreat you for respect of Dionusos leave them free and their own masters. For Dionusos, when having conquered the Indian race he returned to the Hellenic Sea, from the worn out of his army (these had he and the Bacchoi) founded this city in memorial of his wandering and of his victory to after generations; even as thou thyself hast founded Alexandria in the Kaukasian mountain and another Alexandria in the soil of Egypt and many others hast thou already founded and shalt found from time to time even as thou hast shown greater exploits than Dionusos. Dionusos a suredly called this city Nusa, after his Nurse Nusa, and the country Nusaia, and that mountain which is near the city, Dionusos named Meron, because according to fable he grew in the thigh of Jupiter. Thence have we dwelt in Nusa the free, and we are free and are a commonwealth. And of our origin from Dionusos, be this to the testimony, "the ivy which springs in no other Indian soil grows with us."

Alexander believes their tale, gives freedom to the city and takes three hundred of their horsemen into service.

"And the desire seized Alexander to see the place, of which the Nusaioi boasted such memorials of Dionusos. To visit Mount Meros with his bands of horse and foot companions, and to see on all sides the ivy and the laurel and wood of all kinds, and to see the shade and that the wild beasts in it were of every country, and the Macedonians beholding with joy the ivy, beheld after a long interval (for there is no ivy in India, not even there where are vineyards) they quickly made crowns of it, and wearing garlands sang aloud, and invoked Dionusos and the surnames of that god. Alexander also burnt incense to Dionusos and banquetted together with the companions."

I have preferred giving the extracts continuously for the benefit of those who may not have means of reference to the histories. I may have occasion to quote separate passages in illustration of my argument.

It is impossible to read the above narratives with the knowledge we at present possess of Sohaut, without the conviction that Alexander conquered that country before he attacked Aornos. The evidence of this is, his having entered the country of the Gouraioi and crossed their river Gouraios, called to this day Punj Gowra, the people still retaining their name of Gowr: and that the ruins of Masagorh in the Seh Bhoochnia valley of Sohaut (see map) exactly agree with Curtius' description of Mazaga (Arrian's Massaga). Whilst the people of Massaga were the Assakani or subjects of Assakhan, and the people of Mazagôr are the Assazye sons of Assa. We have therefore only to decide which route Alexander chose in the invasion of Sohaut.

Now from Julalabad three routes into Sohaut were open to him.

1st. Up the left bank of the river Kooner, over hilly but not mountainous country upon Bajore, which the route attains about that bend of the Punjgowra (Gouraios) where stood Khar* i Bungaiish the old capital of Bajore. There crossing the river Gouraios he would have entered the country of the Gowr (Gouraioi) and have conquered successively, the Gowr, the Abakhail, the Assazye and Ashakhail, and would then have besieged Masagorh in the Seh Boochnia valley, afterwards finishing the conquest of western Sohaut in the subduction of the Drooskhail in the Sukra valley. Then crossing the Suastus, (Sohaut Sinde,) he would have conquered the richest, most powerful and most densely peopled moiety of the Sohaut valley from North to South, and, leaving the valley by the southern pass, have proceeded to the eastern Eusufzye to besiege Ora (Oond) and Bazira (Baja).

By the 2nd route from Lalpoor directly north, he would have traversed the hilly country of the Momunds and entering Bajore from the south, would then have progressed as described above in the 1st route.

By the 3rd and more obvious route crossing the Nagooman at Lalpoor, he would have threaded the Caroppa Pass, have entered and conquered the Doaba of Shubqudr, have crossed at Ashtnugr the river of the Eusufzyes, or, as they still call themselves, Asupzye, Aspasioi, i. e. the Issupqwur and would have found himself in the

* Khar signifies in the language of the country a town or village.

country of the Aspasioi. He would thence have made a forced march through the pass into Sohaut, have conquered that rich and powerful country eastward of the river; have re-crossed the Sohaut Sinde above its junction with the Punjgowra (Gouraios); have subdued the Sukra valley, and then have laid siege to Masagorh in the Seh Boochnia valley. Then finishing the conquest of western Sohaut, with perhaps the Gowr tribe, he would have crossed the Punjgowra (Gouraios), have conquered Bajore, and have returned through Ashtnugr and the Eusufzye, in progress to Hoond and Baja on the Indus.

It may be worth while to lay side by side the features of the 1st and 3rd routes with the route laid down by Arrian:

<i>According to 1st and 2nd route.</i>	<i>Route by Arrian.</i>	<i>By 3rd route.</i>
Crosses the unfordable river Nagooman. Skirts left bank of the river Khoés or Kooner river over hilly ground, crosses the hills into Bajore and debouches upon the old capital, Khari Bungaish. (By the second route he reaches Khari Bungaish by Munni, Bhayd, Nawagye or by diverging to the east by a village called Undaka).	Rugged pass thro' a country bordering the river Khoés or Khoee or Khoá. Nameless town. Andaka surrenders and is occupied. Krateros left to settle a country. River Euaspha, called by Curtius Choaspes.	River of Nagooman or Qwur Nagooman. Lalpoor. Doaba of Shubqudr. River of the Eusufzyes which may have been Qwur Asuf or Khoaspes, or Asupqwur Euaspha, being the united streams of the Sohaut Sinde and Punjgowra.
	Uparch of the Aspasioi.	Asupzye as they still call themselves in the valley of Ashtnugr.
	Two very long marches to a city. Inhabitants burn it, and flee to the mountains.	Tungipass into Sohaut leading upon the old capital Birikot and upon many towns of 1000 to 1500 houses.
	Battle on the mountain side. Ptolemy kills and spoils the leader of the Indians.	Conquest of eastern Sohaut a very populous and warlike country abounding in strong mountain posts

In Bajor.

<i>According to 1st and 2nd route.</i>	<i>Route by Arrian.</i>	<i>By 3rd route.</i>
	Transit of the mountain.	on the spurs which abound upon the Sohaut Sinde River.
	City Arigaïos* or Arigaion burnt by the inhabitants.	From one tributary valley to another.
	Battle on the mountain top,† capture of 40,000 men and 2,30,000 oxen.	
Fords the Punjgowra by a ford difficult and dangerous in the spring from the rapidity of current and size of the boulders.	Passage of the Gou-raïos by a ford difficult and dangerous from the strength of the current, and the round slippery boulders at bottom.	
Country of the Gowr tribes still so called.	Country of the Gou-raïoi.	Country of the Gowr tribe to this day.
Conquest of western Sohaut where the Assarzyes or sons of Assa (Khan) Assakanus, are still the most important branch of Eusofzye of western Sohaut.	Country of the Assakenoi or subjects of Assakanos.	The most powerful tribe on the west of the Sohaut Sinde, are still the Assazyes, sons of Assa and the Ashakhail or tribe of Asha dwelling together in the valley contiguous with that occupied by Massagorh.
Siege of Massagorh which seems to exist as a ruin in the Sehkanoos,‡ described by Curtius.	Siege of Masaga chief town of Assakanos,‡ described by Curtius to be girt on three sides with chasms.	Siege of Massagorh the chief fortified town western Sohaut the ruins of which still exist as described by Curtius in the valley

* This name may be Aragaon or Hurrigaon, or Oorigaon.

† This denotes a most populous and rich tract, and can refer, I think, only to eastern Sohaut.

‡ Assakanos was a chief or king. Curtius styles his mother Queen. It is probable that he was the dominant chief of Western Sohaut, and, as such, Lord paramount of Massagorh, although it is not in the valley at present occupied by the Assazye or sons of Assa.

<i>By 1st and 2nd Routes.</i>	<i>By Arrian.</i>	<i>By 3rd Route.</i>
Koinos sent to besiege Bajá, the ruined fort of which still remains on a hill near the present village, see the Eusofzye country near the Indus.	Attalos, and Alketos sent to besiege Ora (Ωρα.).	of the Selh Bhoochnia adjoining that of the Assazye.
Alketos Demetrius and Attalos sent to besiege Ora, i.e. either the ancient Oond, of which the old sites are still called Oora; or Ooria an old fort strongly sited N. east of Gunduf. The people of Bajá flee to the mount Mahabunn.	Koinos sent to besiege Bazira, builds around it a wall, described as on a height and very strong.	Attalos and Alketos sent to Oond. Koinos sent to besiege Baja in the Eusufzye.
Hephaistioon and Perdikkas fortify Arabutt (ruins still existing) to protect the ferry of the Loondi or Koopheen river.	Baziroi flee to Aornos. Hephaistioon and Perdikkas fortify the town Orobatis.	Baziroi flee to Mt. Mahabunn. The ruins of Arabutt exist on the left bank of the Loondi river near Nowashihr. It was no doubt fortified and garrisoned to keep open the ferry or bridge of boats connecting Peshawur with the Eusufzye.
	Alexander visits the Indus and having taken Peukela by surrender, inserts a Macedonian garrison under Philip.	The capture of Bazira or Baja set Alexander free to visit Peshawur, called still Pekawur.
	Appoints governors over the countries bordering the Indus.	This certainly gives the impression that in marching from Peshawur to Embolima, Umb
	Alexander marches to Embolima, a town sited near Aornos.	Balima, he went up the Indus. Umb is still on the right bank of the Indus at the highest point accessible to an army, and

<i>By 1st and 2nd Routes.</i>	<i>By Arrian.</i>	<i>By 3rd Route.</i>
	Siege of Aornos.	about sixty miles above Atuk. Balimah is one of the spurs of the Mahabunn directly above Umb, and is said to have once held a fort.

On careful comparison of Arrian's narrative with these routes, the following difficulties are manifest. After crossing the river Khoes, Alexander pauses not, having apparently there met with no opposition, but pushes on by a forced march to a considerable city. This in all probability was Birikot the old capital of Sohaut, founded by that Raja Viraht in whose service the Pandoos, when disguised as menials, engaged. The extensive operations following and especially the capture of 40,000 prisoners and 230,000 head of cattle could scarcely have occurred any where but in the populous and productive valley of eastern Sohaut, where every village is a town in dimensions. Alexander having effected this, could not have needed to cross the Punjgowra river (Gouraios) in order to enter the country of the Gouraioi and Assakanoi (Gowr and Assazye), nor to besiege Massagorh (Massaga) which according to my best intelligence lies in the Seh Bhoochnia valley. He would have had to cross over the Sohaut Sinde which has a good bottom and no boulders. His course then would lie to Massaga *first*, and *afterwards* to the Gouraioi, dwelling still upon the Punjgowra river. And it is certain that Alexander would not take Massagorh without completing the conquest of the important valley of Sohaut: a valley which can muster 80,000 fighting men. Had not the river Gouraios and the Gouraioi been mentioned I might have supposed that he did not visit Sohaut, but that the Massaga taken by him was a Moosagurh which is said to exist as a ruin near Besuk belonging to the Moosakhail.

Again, after the capture of Massaga, two divisions of the army are sent at once to besiege Bazira and Oora, which, if we are to identify with Bajá and Owra or Ooria on the Indus, was a long march through a hostile country to be accomplished without inci-

dent. It is very true that an Owra is said to exist in Sohaut not far from Massagorh, and that a Beejapoor is said to exist in the Abakhail valley. But I have not been able to discover any Aornos near either of these: and, as I have before observed, if Aornos be not close to the Indus we have absolutely no clue to its discovery.

If we try these routes by the narrative of Curtius we shall lead Alexander by route the 1st or second into Bajor, thence to the Koh i Mohr Baba, which in following Curtius, we must identify with Mt. Meros. He would then have crost the Sohaut Sinde into eastern Sohaut and after visiting Doodial and the Kaldura (*Dædala* and *Acadera**) have past south to Ashtnugr, where recrossing the Qwur Asup (*Choaspes*) he would have been in the valley of Shubduqr and from thence have proceeded north to Massagorh. But it is difficult to believe that such could have been his course:—that he should have left Sohaut half conquered to visit Ashtnugr, or that, wishing to besiege Massaga and having collected his war-engines for the purpose, he should have needlessly recrossed the river Choaspes in order to get a road impracticable to his war engines. Curtius therefore lends us no aid. And if the position of Massaga in my sketch be correct, even Arrian's narrative must be regarded as a general account of the operations, not as copied from the journals of those who accompanied the army.

It appears to me probable that the real course of Alexander from Julalabad (*Nikaia*) was to Lalpur, thence to Shubqudr. Then across the Issupqwur or Qwur Issup (*Easpla* or *Choaspes*) to the district of Ashtnugr to subdue and govern which and the Shubqudr Doaba he left Krateros and others for awhile whilst he pushed on by a forced march to surprise Birikot the ancient capital of Sohaut. That there completing the conquest of eastern Sohaut he recrossed the Sohaut Sinde before its junction with the Punjgowra, besieged and took Massagorh in the country of the Assazye and Gowr, and not till then crossed the Punjgowra to subdue Bajor. He would then be at leisure to visit Oond and Bajrá (*Oora* and *Bazira*) and

* It is remarkable that not only in Sahout, but also in the Eusufzye close to Bajrá and Oond (*Bazira* and *Oora*) we have a *Dotala* and a *Kaldurra*, see the map.

after their fall to visit Peshawur, which had meanwhile surrendered to him, and to go through the eastern Eusufzye country bordering the Indus with the Uparchs of that district. And here he prepares for the expedition against Aornos. Arrian writing several hundred years after the event, and without any authentic map of the country might well be perplexed by conflicting authorities (there being, then, several histories of the expedition) and the order in which events followed, may thus have been somewhat confused. Certainly it seems to me that the Choaspes or Easpla are identified beyond doubt in the Qwur Issup or Issup Qwur river of the Issupzye a name still borne by the eastern branch of the Sohaut Sinde. That the Khoes or Khoe or Khoa (for we nowhere have the nominative case) is the river Nagooman appears highly probable. Khoa is probably the Greek rendering of the word Qwur a river.

The account given me by a native of the country, of the site of Massagorh strongly coincides with that of Curtius. He describes it as accessible only from the north and as having on the other three sides a scarping of gigantic precipices, and reports it to have stood a siege of many years. It is now deserted. He however, thinks that there is another Massagorh in Bajor.

With respect to Bajrá and Oond as representing Bazira and Oora, the following arguments appear to me strong. Arrian distinctly says* that the Baziroi fled for refuge to Aornos.

Curtius after relating the capture of Oora says,† “many obscure towns deserted of their inhabitants came into the king’s power, whose armed citizens occupied a rock called Aornos.” It would be inferred from the passage that Aornos was not far from Oora.

Now that Aornos was near the river Indus, appears from the following testimony. Arrian makes Alexander pass through the district bordering the Indus in going against Aornos.

* Καὶ ταῦτα οἱ ἐν τοῖς Βαζίροις ὡς ἐμαθὼν ἀπογνοντες τὰ σφετέρᾳ πρᾶγματα, ἀμφιμέσας νυκτὰς τὴν πόλιν ἐκλείπουσιν, ἐφυγον δ’ ἐς τὴν πέτραν, ὡς δὲ καὶ οἱ ἄλλοι βαρβαροὶ ἐπράττον. Ἀπολιπόντες γὰρ τὰς πόλεις συμπαντες, ἐφευγον ἐς τὴν πέτραν ἐν τῇ χώρᾳ τὴν Ἀορνον καλουμένην. Ar. Lib. 4, ch. 28.

† Multa ignobilia oppida deserta a suis venere in regis potestatem: quorum incolæ armati petram, Aornon nomine, occupaverunt. Curtius.

Curtius says of it,* “Its roots the Indus enters scarped on either side with rugged cliffs” and again† “Wretched was the fate of many whom the river sucked down as they fell from the broken rocks.”

Strabo says of it “When Alexander‡ had taken in the first assault a certain rock called Aornos, whose roots the Indus not far from its springs, washes.”

This authority having the greater weight in being all the record of the position of Aornos left by ancient writers.

We therefore require that Bazira at least, if not Oora, and Oora probably, should be near the Indus. The Oora in Sohaut and the Beejapoor in Sohaut or Bajore will therefore not answer; and our attention is required to Baja and Oond, formerly Oora, on the Indus.

Baja still exists as a village, but the ancient site, which was fortified, is now a ruin occupying a small hill about half a mile distant. It stands in a densely inhabited portion of the Issupzye country and the natural refuge of its inhabitants are the mountains Aonj and Mahabunn, both washed by the Indus. Mt. Aonj however is less suited than Mahabunn for such an asylum, because the latter has more water and is farther removed from an enemy occupying the plain. The Issupzye are by far the most gallant race of all the tract passed by Alexander in this expedition Trans-Indus. Bazira stood upon a height.

Oond sometimes written Hoond is still one of the chief towns of the Issupzye. It has still a considerable castle of solid masonry which commands a principal ferry of the Indus. It is separated from the territory of Abisares by the river Indus only, and Arrian tells us that Abisares had sent his agents thither, i. e. to Oora. Several old sites apparently of this town still remain about a mile to the westward of the present fort. They are said to be called still Oora. I think it most probable that this was the Oora mentioned by Alexander's historians.

* *Radices ejus Indus amnis subit, præaltus utrimque asperis ripis.* Curtius Lib. 8, ch. 36.

† *Multorum miserabilis fuit casus, quos ex prærupta rupe lapsos amnis præterfluens hausit.* Id. Lib. 8, ch. 37.

‡ *Αορνον δε τινα πετραν, ης τας ριζας ο Ινδος υπορρει πλησιον των πηγων, Αλεξανδρου κατα μιαν προσβολην ελοντος.* Strab. lib. 15, p. 688. a.

There is however, the ruin of a considerable castle and town called Ooria on a hill N. east of Gunduf. The retreat of the inhabitants of either town from an enemy, would be the mountains Aonj and Mahabunn, but Oond has probably been always a place of consequence: whereas the position of Ooria though stronger is less important; and any one acquainted with the Issupzye country would I think go straight to Oond in search of Ooria.

I suppose then that Alexander after his visit to Peshawur and after the complete settlement of the Yoosufzye, ascended the right bank of the Indus with his army as high as an army can ascend. This would have brought him to Umb, which is overshadowed on the west by a spur of the Mahabunn called Balimah or the Windy, answering well to Arrian's Embolima, where Alexander left Krateros with half the force to collect supplies. All supplies must have been brought from the Eusufzye, the river beach having little soil, not sufficient for its own population.

A force sitting down at Umb Balimah (Embolima) could have come thither only to attack the Mahabunn or the fort on Mt. Behoh, now belonging to the Hussunzye. Had the operations been directed against Mt. Aonj, a name convertible into Aornos, the force would have halted at Khubl or at Sitaua, whence there are paths into Mt. Aonj. From Umb is the ordinary path up to the summit of Mt. Mahabunn.

Mt. Aonj or Wung* or Bunj is however too remarkable a summit to be passed without notice. It stands between the Indus and the southern end of the ridge of Mahabunn. Its height above the stream of the Indus may be about 3000 ft. The acclivity is always very steep, led horses cannot ascend it. The mountain is generally naked. But the main summit has a few fir trees. This summit shows remains of a few houses or of a small temple, but not of a fort. The mountain has very little water and almost no soil. It is one of the least accessible of mountains to an army. It is the natural refuge of the people of Baja and of that part of the Eusufzye. When Nadir Shah carried his army up to the summit of

* This name belongs also to a tree, which from description I take to be the ilex, or mountain oak.

Mt. Mahabunn, an Akhoond* learning his intention, had written the following doggrel prophecy and warning to his brethren.

Roonó, charro, punjó
 Bunj oopur, chur wunjó
 Chuhlta kullahs n'h shoo,
 B'h duah humzurh b'h jooz koorm.
 Cheh oowyhee pa punjo.

Of which the following is a translation :

O brothers, four or five
 Climb ye up Mt. Wunj
 Flying shall ye not be free (until)
 With my prayers will I create a lion
 Who shall slay with his paws.

The main summit of Mt. Wunj retreats from the river. A high naked ridge intervenes of which the base borders the Indus. Upon this ridge just above Kyah is the site of an old fort now called, like a thousand others, Kawfur Kot. It must have been nearly inaccessible. It stands upon the naked rock where there is no soil. I should estimate its height above the river at 1700 feet.

But this site will by no means suit Arrian's description of Aornos, and there are particulars in which it differs from the Aornos of Curtius. For instance, a chasm separated the fort or rock from the besiegers, a forest was at hand and with it Alexander filled up the chasm. But here we have neither chasm nor forest. And if by the word eluvies voraginesque we are to read quicksands or morasses as obstacles to the attack of Aornos, we must leave the mountain summit and descend into the bed of the Indus. Tradition is silent concerning this fort or rather site. As before observed, had Alexander come to attack Mt. Aonj† he would have made his camp at

* This saint bears the title of Huqueem Sahib of Hindoostan, his name is not known. Nadir by ascending the Mahabunn captured all the cattle and many of the families of the Eusufzyes (Aspasioi.)

† It is curious that when my position of Nara was threatened by a Sikh army of 10,000 and a Doorani army of 12,000, both encamped in sight, the people of Khubl and Kyah sent me an earnest invitation to take refuge with them, assuring me they would place me on a hill never violated by Alexander. They meant, I believe, Mt. Aonj.

Khubl Kyah or Sitana, where the paths of ascent commence. In going to Umb he must have returned a march to either of these places in order to attack Mt. Aonj. Alexander, as will be observed in the extracts from Arrian, took with him a small body of cavalry and mounted archers in the attack of Aornos. Now this cavalry could not have ascended Mt. Aonj, and if they should have ascended, would have been utterly useless there. Whereas led horses continually ascend Mt. Mahabun, at the summit of which is an open plain where cavalry could act with advantage. It is manifest that Alexander was about to ascend a mountain, having a table summit, wherever that mountain might be sited.

Alexander according to Arrian made two short marches from Embolima (which was near Aornos) towards the rock. Having with him his war-engines, his progress up the mountain would naturally be slow. Two natives of the country then offered to show him a point whence he could assail the rock and Ptolemy was sent with a small force to seize this point. Ptolemy evading the enemy arrived at the point and secured himself there by a ditch and a palisade. He then lighted a beacon to inform Alexander of his success.

All this account will answer well for the Mahabun, which is a mountain table, about five miles in length at summit, scarped on the east by tremendous precipices, from which descends one large spur down upon the Indus between Sitana and Umb. The mountain spur being comparatively easy of ascent, would not probably be contested by the natives who would concentrate their power to oppose the Macedonians as they scaled the precipitous fall of the main summit. The great extent of the mountain, covered as it is with pine forest, would enable Ptolemy under the guidance of natives to gain any distant point of the summit without observation.

The third day the opposition commenced at a very steep ascent of the mountain. Alexander here could make little way, after fighting from daybreak to sunset. And the Indians perceiving this, fell upon Ptolemy's force on the mountain endeavouring to tear up the palisades. They were however repulsed towards evening. Alexander during the night wrote Ptolemy to attack the enemy in rear, whilst he next day should attack them in front. This succeeded and the mountain summit after much fighting was won.

Alexander was now upon a plain with the rock as it is still called before him. He immediately felled the forest, each soldier contributing one hundred young trees to the work, and dug a trench of approach with a parapet, which the first day was advanced about 125 yds. On the third day they reached the rock or fort. It was then that a small body of Macedonians made a dash at a little hill as high as the defences of the enemy and carried and secured it. And Alexander exerted all his energies to bring the trench up into contact with this hill. The enemy in despair sent to ask terms and during the night evacuated the place.

The whole account of Arrian of the rock Aornos is a faithful picture of the mountain Mahabunn. It was the most remarkable feature of the country, as is the Mahabunn. It was the refuge of all the neighbouring tribes. It was covered with forest. It had good soil sufficient for a thousand ploughs, and pure springs of water every where abounded. It was 4,125 feet above the plain and fourteen miles in circuit. It was precipitous on the side of Embolima; yet not so steep but that 220 horse and the war-engines were taken to the summit. The summit was a plain where cavalry could act. It would be difficult to offer a more faithful description of the Mahabunn.*

Why the historians should all call it the rock Aornos, it is difficult to say. The side on which Alexander scaled the main summit had certainly the character of a rock. But the whole description of Arrian indicates a table mountain.

The fortification itself though styled the rock does not seem to have been very lofty nor formidable. Alexander went at it without scaling ladders the night of its evacuation, and was the first to ascend it. This we learn from the remark that the soldiers drew one another up the rock.

No European in modern days has ascended the Mahabunn. The accounts of natives are so vague, that it is difficult to trust them.

* The word Mahabunn signifies mighty forest or mighty pool. The mountain certainly is covered with forest excepting at summit. It seems to me possible that the original name may have been Mahabutt the mighty rock, which would account for its being always styled the rock by Greek authors.

It is certain, however, that the Mahabunn has been occupied by castles in two or three places.

The best known of these is called Shah Kote or the royal castle, a modern name which may refer to the visit of Nadir Shah, who pitched his tent on that spot.

Another castle is said to have stood on the brink of the precipice facing the east.* The profile is shown in the accompanying outline. To the eastward is a precipice of several hundred feet. To westward is the table of the Mahabunn. To the north is a ravine and beyond it a small hill of the same height as the rock or mound on which the castle stood. The water on which the garrison depended was a spring in this ravine. When the mound was lost the garrison had no choice but of surrender. This site appears to me to answer best the description of Arrian. Ptolemy might easily have passed round to the left, and have occupied the point on the mountain crest. The ordinary path of ascent to the mountain would have placed Alexander also on the left, that is south of the fort. He would have broken ground at 250 yds. that is beyond arrow-flight and have driven his trench up obliquely to the fort. The capture of the small hill near it, would not only have cut off the water of the garrison, but in case of assault, it left them no choice but to fly down the precipice on the east, where every man must have perished in the hot pursuit; whereas when favoured by night, the paths were practicable to mountaineers well acquainted with them.

From Aornos, Alexander went in search of the brother of Assakanos, who had rallied in the mountains and had carried off some of the elephants.

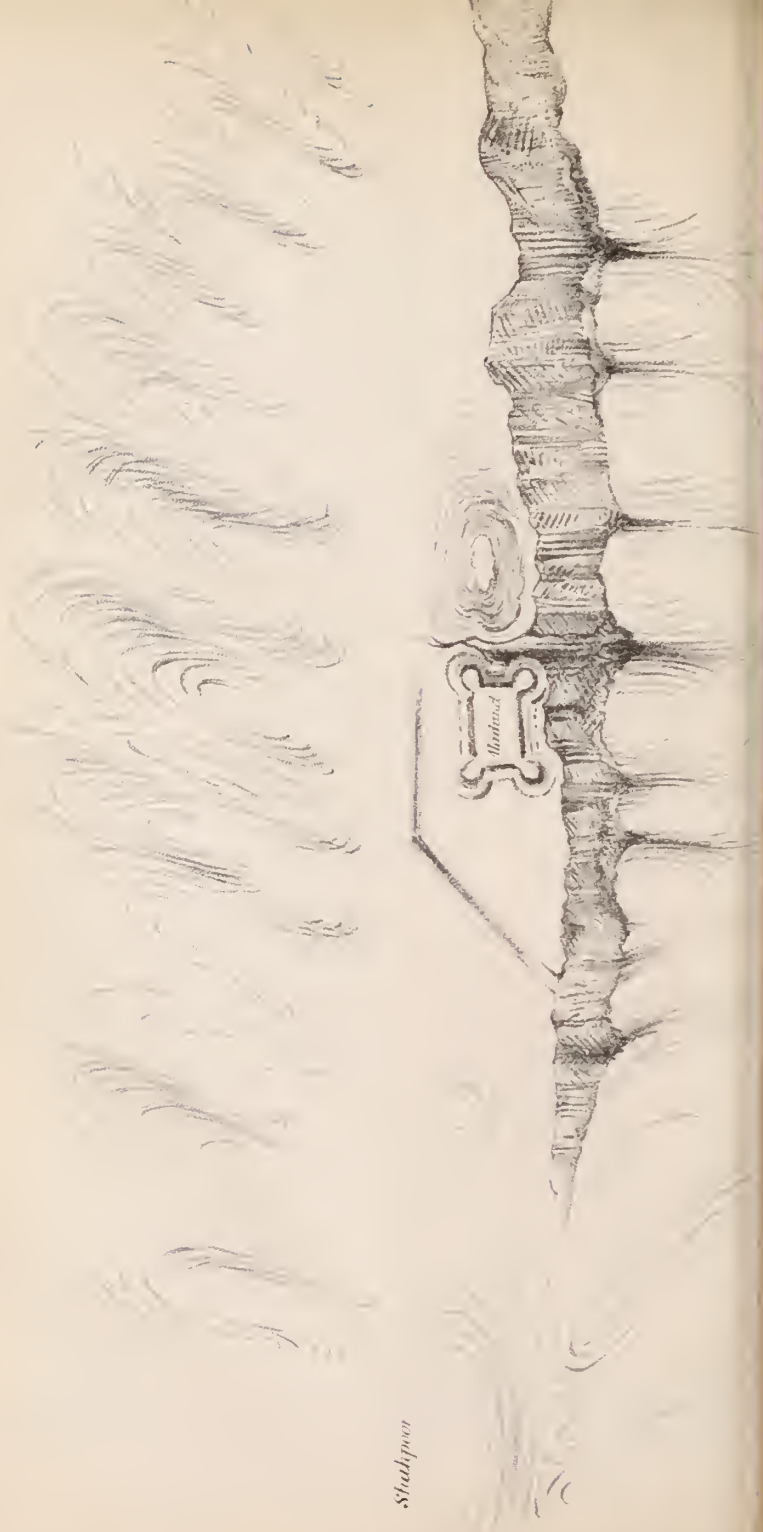
From the summit of the Mahabunn, the extensive valleys of Boonair and Chumla lie spread out to view, the probable retreat of fugitives from Sohaut. When, however, the enemy had mastered the Mahabunn, Boonair and Chumla were no longer tenable. On descending the Mahabunn by the N. or western spurs, Alexander would have found himself in Chumla. The country was utterly deserted of its inhabitants, and Alexander does not seem to have

* This site, so far as I can ascertain, is now called Aladund or Alatund, see letter A on sketch.

- a* Alahund Qu Aruwa
b Alahket
c said to be a Type
d H^o Ang
e Alahund seen thro'
 a Telescope
f R Indus
g M^o Mhowen

Profile M^o Mahabun & Ang. fr. the E East an. of the Indus

Supposed ground plan of the crest of Mahabim at Aladund



Shakpoo

attempted to retain possession of it by inserting garrisons or colonies. He probably thought the valley too remote from support, and too much shut in by the mountains. The principal clan at present inhabiting the valley of Boonair are the Eesak hail. Eesa and Asa are names so semblant in sound, that they would probably be written alike by Greek historians. And when Alexander invaded the dominions of Eesa Khaun, they would naturally suppose some connection between him and Asa Khaun. There is however no improbability in the supposition that the brother of Asa Khaun may have fled to Boonair. The people of Sohaut are Yusufzyes as well as the people of Boonair.

From this fruitless pursuit Alexander returned to the Indus, the army making for him the road in advance. This road was probably the path leading amongst precipices above and along the torrent of the Burrindoo, a river which after watering the valleys of Boonair and Chumla, flows into the Indus above Umb. The path even now is very difficult. This would have brought him back to Umb. There he learnt that the elephants had been left to pasture on the banks of the river. Procuring elephant-hunters, he secured all but two, which fell over cliffs.

This incident is perplexing. It is difficult to understand how the army should have so long occupied the right bank of the Indus, without discovering the presence of the elephants, if those elephants were in any of the islands between Khubl and Atuk, which about fourteen years ago were covered with dense forest,* since utterly destroyed. It seems to me therefore probable that the elephants had been taken up to the Hussunzye valley above the river Burrindoo and there secreted. For supposing them to have been taken across the river Indus† to Umb. Alexander would scarcely have sent a detachment across that river to capture them, as it would

* This forest, so far as I can learn, was chiefly of seesoo, mulberry and acacia, and therefore not food for elephants.

† There is no natural pasture for elephants on the Indus, and although there were formerly forests in all its 300 islands, it is not probable that they were either of burgut or of peepul. Those carried away a few years ago were chiefly seesoo, mulberry and acacia, elephants in the Punjaub are fed upon grain and straw, the latter green, when procurable.

have brought him into direct conflict with Abisares under circumstances of great disadvantage.

From this point, according to Arrian, Alexander caused boats to be built and carried down the Indus. At Umb large quantities of drift timber are yearly arrested at an eddy near Durbund. It is also probable that the pine forest then descended lower than at present. Be this however as it may, there were thirteen years ago forests of fine seesoo, mulberry and willow timber along either border and shadowing all the 300 islands of the Indus.

Curtius says that Alexander after the capture of Aornos came to Ekbolimah. This is generally supposed to be the place designated by Arrian as Embolima. But this idea is liable to question, Embolima seems manifestly a compound of the names Umb and Balima, the one in the river valley, the other on the mountain immediately above it. It is a common custom in the Punjab to distinguish two villages or towns of the same name by affixing the name of some contiguous village, fort or district. Thus Hazara to distinguish it from other Hazaras is still designated Chuch Hazara and another Hazara in the river Chenab is called Tukht Hazara.* Umb signifies a mangoe tree. The mangoe tree the progenitor of which gave its name to Umb, was carried away by the great flood of the Indus thirteen years ago. Balimah is a Hindee compound signifying the airy or windy. It is generally applied to some elevated spot, but both Umb and Khubbul are remarkable for the airiness of their sites and resorted to by persons in the Eusufzye on that account during the dog-days. Umbalimah would signify Umb the airy, Khubbul Balimah; Khubbul the airy, which would easily fall into Ekbolima. Khubbul was on Alexander's route back from Umb to the Doaba of the Indus and Koopheen throughout which according to Arrian, Alexander now proceeded, making according to Curtius sixteen marches to the crossing of the Indus.

Curtius as has been seen, makes Alexander ascend Mt. Merces previous to his invasion of the Assakanoi. Arrian brings him to Nusa and Mount Meros, in this tour of the Doaba of the Koopheen

* In like manner the villages Kala and Durra in the Yoosufzye are invariably named as one. Kaldurra possibly the Acadera of Curtius. There is however another Kaldurra eastward of Birikot the capital of Sahout.

and Indus after the capture of Aornos. Both cannot be right. Those who follow Curtius, have endeavoured to discover Nusa near Jullalabad, Capt. Cunningham is of this number. Wilford, I believe, thought he had identified Meros in the Markoh or hill of snakes standing northward of Bussawul. The remains of caverns at the foot of this mountain he supposed to indicate the site of Nusa. Wilford had not visited the spot. Masson who visited it takes a very different view.*

The objection to any site for Nusa in the valley of the Cabul river below or about Julalabad is, that Curtius, our only authority for enquiring in that neighbourhood, describes Nusa as hidden by dense groves, in which were tombs of ancient cedar, and that the cedar will not grow in this heated valley, where the hot wind prevails in summer. Curtius also describes the Macedonians who had just surmounted the snowy Caucasus as being there chilled by the excessive and unusual cold of the night air. We should therefore expect to find Nusa sited in an elevated valley, where the cedar, if not a native, can with care be made to grow.

The description however of Curtius has a half fabulous air. The army encamps near enough to a large city to hear the bark of a dog. Yet is utterly ignorant of the proximity, and the citizens are equally ignorant of the presence of a large army and its battering Train. For Father Bacchus who delights in disguise has spell-bound the senses of both parties. The bark of a dog first informs the Macedonians that their camp is close to the walls. Arrian's description has much more the appearance of fact.

On the left bank of the Sohaut Sinde just previous to its junction with the Cabul river, is the village Nisutta, standing in the plain

* "In the distance is a lofty hill on the opposite bank of the river; from Bussawul are seen the caves with triangular shaped entrances, noted by Wilford, and which partly induced him, probably with the vicinity of the Markoh which he supposes to be Mount Meru, to locate the ancient city of Nusa in this neighbourhood. On this point we may not decide. Caves are too numerous and too universally found, that any important deduction could be drawn from so comparatively trifling a group as is here presented. And whether Markoh may have any more serious etymological signification, than the Snake-hill, as understood by the natives is doubtful. Still Bussawul exhibits ample vestiges as does the entire neighbourhood of its ancient inhabitants. The spot is called Chakanor." Masson's Travels.

distant from all hills. Extensive ruins connect Nisutta with Dehri a village now four miles apart from it. Nusa was probably not only a town but a republic, comprising several towns or villages. It furnished 300 horse to Alexander. Nisutta appears to me too far from the mountains to answer to the description of Nusa.

Upon the eastern border of Bajor is a lofty and remarkable mountain called by the Bajoris Koh i Morh Baba, or Mount of Father Mohr, which might very possibly be a corruption of Meros or Meroo. It is covered with cedar and other forest trees, including wild fruit trees, has a shrine at the base, and is regarded by the people as a kind of Parnassus, tenanted by the Boozoorg or spirits of the departed.

- It is the place of refuge in times of invasion to the Bajoris. The shrine is said to be a mere tumulus of earth shadowed with trees.

Now it is a remarkable fact that many of the most venerated of the Mahomedan shrines in this tract are old Hindi Teeruts or shrines which have retained their hold upon the veneration of the people in spite of a change of faith. Thus all the Punjpirs* so common near the Indus are spots, sacred in Hindi lore to the five Pandoo brothers, Yoodhistira, Bheema, Urjoona, Nukoola and Saho Deva. It is therefore probable that the hill Meros is to this day an object of veneration to the inhabitants, and that Bacchus has become a Mahomedan saint, although his present votaries have forsworn wine.

The position of the Koh i Morh Baba is between Bajor and the Doaba of Shubqudr as indicated in the sketch map, accompanying. It is therefore westward of the river Koopheen, whereas Arrian's account would lead us to suppose Mt. Meros and Nusa to lie in the Doaba of the Indus and Koopheen. The indications boasted by the people of Nusa as peculiar to their mountain, will no longer serve us as

* Punjpir or the five saints or worthies. Their names are known to few, and I had some difficulty in ascertaining the designations of the saints who have succeeded the Pandoo brothers.

There are four hills bearing the name Punjpir in this neighbourhood (Hazara) viz. the isolated hill above Zayda in the Yoosufzye. The isolated rock at Hussun Ubdal. The mountain overhanging Atuk eastward; and the highest point of the mountain on which stands the British castle of Dunna in the Dhoond country Hazara.

If we follow Curtius, it will be difficult to avoid identifying Mt. Mohr Baba with Mt. Meros.

guides. The ivy, if indeed it was then confined to Mt. Meros, now abounds in hills and valleys exceeding 4000 feet throughout Huzara. It is remarkable that it is by Hindi lore sacred to Hercules, bearing the name Hur Bail.* But I do not remember to have met with it in the arid stony plains and naked mountains of Afghanistan. It is a plant rapidly propagated by birds, and it is not absolutely impossible that it may have been introduced by the Bacchic Colonies, as the wild olive seems to have been introduced by the Macedonians.

If we follow the history of Arrian in our search for Nusa and Mt. Meros, we must place ourselves on the right bank of the Indus, and from thence proceed into the Doaba of the Indus and Koopheen. Mr. Williams, in his history, thus happily disposes of the difficulty. Alexander we have seen on returning to the Indus from Aornos, ordered timber to be felled and boats to be constructed.† On which Mr. Williams observes: "It was as the fleet was falling down the Indus that he visited Nysa."‡ Now the building of a fleet from timber, great part of which had to be felled, squared and sawn, could not have been the work of a day or of a week, and Alexander would scarcely have waited on the spot a couple of months, in order to drop down a river along the border of which he could march in three days with his army. It seems to have been his purpose in perambulating the Eusufzye to enable the workmen to prepare a sufficient number of ferry boats for the passage of his army. We cannot therefore from any passage in Arrian positively insist upon finding Nusa on the bank of the Indus, although such a site might not be improbable.

The most remarkable sites on the right bank of the Indus below

* i. e. the creeper of Hur or Hurri.

† From the following passage in Plutarch we learn that Nusa was washed by a deep yet fordable stream. "When he sat down before Nysa the Macedonians made some difficulty of advancing to the attack on account of the depth of the river which washed its walls, until Alexander said 'What a wretch am I that I did not learn to swim,' and was going to ford it with a shield in his hand. After the first assault ambassadors came offering to capitulate." See Life of Alexander. Langhorne's Translation.

‡ Mr. Williams seems to have adopted Rooke's reading of the passage which certainly differs essentially from the text of the most esteemed edition of Arrian.

Umb are 1st Ushra, at present a large village standing in a spot of great strength at the southern end of a rocky height, about 300 feet in altitude and protected by the little castle of Kotla* overhead. The village has little land, and it is difficult to suppose it ever to have been a considerable town, owing to the great difficulty of procuring food in a spot so confined and so remote from the plains. The name Ushra has no resemblance to Nusa. Yet the mountain immediately overhanging Ushra on the S. West is called Mhowra, being a gigantic spur from the mountain Mahabunn. This mountain Mhowra, may have an elevation of 2,000 feet above the waters of the Indus. When Nadir Shah invaded the Mahabunn his attention was attracted by the sound of a spinning-wheel on Mt. Mhowra, whither a large number of the people had fled for refuge. He sent up a detachment and destroyed the fugitives.

About four miles below Umb, stand the two villages of Sitana and the village Mundi.

They are small villages, but Mundi has been the site of a yearly fair which has fallen into disuse in the present day. Above them are, on the north a spur of the Mahabunn, on the west the lower or eastern process of the mountain Aonj or Wunj.

Below these villages come successively upper Kyah, lower Kyah and Khubl, all of which form a little commonwealth of 5 or 6,000 souls. Khubl so-called it is supposed from the abundance of Dhoob

* The castle of Kotla is very ancient, being built according to Sanskrit history by Raja and called by him Urniya or the unapproachable, or virgin fort. Urniya was very possibly the true name of Aornos, and there are some particulars in which Kotla or Urniya will answer to Curtius' description of Aornos, better than any other fort on the right bank of the Indus. For on the side of the Indus it has a sheer precipice of about 250 feet, from the hawk of which assailants might be hurled into the Indus. It has also on the north, a small break or a chasm between the site and the rest of the hill, which, supposing the works to have extended so far, must have been filled ere the fort could be attacked. And although the castle is at present a place of little strength, there is abundant evidence that the works have been far stronger and more extensive. On the other hand, no one would readily believe that either Hercules or Alexander would have thought much of the capture of Kotla, and if Kotla could be supposed to be Aornos, Arrian's narrative, which is circumstantial and apparently trustworthy, must be wholly rejected.

or Tuft grass there produced, and called in this country Khubl, is by far the most remarkable village on the right bank of the Indus. It consists of several separate inhabited areas. One a rock, which on the rise of the Indus, is isolated, and the others on a slight elevation at the foot of mount Wunj. Nearer to the mountain is the site of an older village now called Ghazikot, from which are turned up Scytho Greek coins of the age of Mauas. I can, however, discover no mountain in that neighbourhood, answering either in character or in name to Mt. Meros. The people of Khubl are Eusufzyes, of the Ootmaunzye branch of the Mundur division. They form a little commonwealth, well answering the description of the Nusaioi. The people westward of them are Juddoons or Guddoons, or Guddana: at Umb on the north are at present Tun nawulies; and the Indus without boat is on their east. They are thus peninsulated, and have often difficulty in holding their own. Their superior courage alone has saved them.

About three miles below Khubl is the village Nochi, the only site that in name resembles Nusa. It is at present a small village at the mouth of a ravine descending from Mt. Wunj. Behind it is the site of the old town which might have contained 1,000 houses. In the ravine is the shrine of the Saint Hajji Rehman Baba. He who sits all day at this shrine becomes bullet-proof. The spurs of Mt. Wunj rising above Nochi are called Srikot, Pathan Rohr, Koonda, Kapooreôn da Gut, Kawfur Lurri, and Jubbi. None of these bears any resemblance either in character or name to Mt. Meros. If Nochi be Nusa, then Mt. Wunj is Mt. Meros. It however does not answer to the description of the historian. It has neither grapevines, nor fruit trees, nor laurels, nor dense groves, nor the wild beasts of all lands. On the contrary, though a sublime and almost inaccessible summit, its character is that of barrenness. Near the crest however, there is a little pine forest, and the ruined walls of five houses are standing there, in one of which was lately found a sledge hammer, so rotten, as to break into powder upon the anvil. Although therefore the name Nochi answers well to Nusa, which in process of time would probably have been thus changed, and although the state of the society of Nochi and Khubl answers well with that of Nusa, yet other particulars are against the identity,

and we must proceed into the Eusufzye in our quest of Nusa. Here the most remarkable town is that of Zayda, standing in the plain of the Eusufzye near the isolated hill bearing the name of Punjpir and venerated alike by Hindoo and Muhummadan : by the former as being the seat of the five Pandoo brothers, after that Yoodisthera had gambled away the throne and empire of Inderprust, the present Delhi. The hill may be about 800 feet in height, but although so noted in traditionary lore, it will not answer to the description of Mt. Meros, being a rock covered with low jungle.

There are some who think Ashtnugr to be the site of Nusa, but I think upon slender grounds. Ashtnugr* has no mountain to overshadow it, and is manifestly an ancient name.

Punjtar is after Zayda, one of the most remarkable of sites in the Eusufzye. It is a valley surrounded on all sides by mountains, of which the principal is the Mahabunn lying on its north, and separating it from the valley of Chumla and Boonair. I have never been able to discover any traces of Nusa or Mt. Meros in that neighbourhood ; which however I have never visited.

I have, perhaps more than once,† had occasion to allude to the remarkable isolated summit called Elum. It was not until this essay had been almost completed, that I discovered its identity with the Rám Tukht of the Hindoos. This led me to the enquiry whether it might not be the Mt. Meros we are seeking, and there are many points of resemblance.

Rám is no doubt identical with Bacchus. And the throne of Rám is Mt. Meros. Eleleus is one of the names of Bacchus from which Elum may be derived.

Mt. Elum is one of two pre-eminent and isolated summits standing upon the boundary of Sohaut with Boonair. The twin summit

* Ashtnugr is in Sanskrit history called Eeshnugr. Eesh being one of the names of Shiv'h, who in some respects resembles Bacchus, being addicted to intoxicating drugs, having the tiger's skin, and worship being offered to his genitals. If the Koh i Mohr Baba be Mt. Meros, probably no site will answer so well for Nusa as Ashtnugr or Nicetta. But there seems to me too great an interval between mountain and city, which moreover belong to separate districts and commonwealths—an unfordable river intervening.

† In other papers.

is Mt. Doserra, or the two-peaked. The mountains are so well matched in height, as to leave it matter of doubt which has the pre-eminence. Each has its own advocates, and blood feuds sometimes arise from the question; the Guddazyes swearing by Mt. Elum, the Punjpye by Doserra. One of the names of Bacchus was (*Βουκερως*) the Bull-horned. Another, Bimater or the two-mothered. Both might refer to the double mountain, each peak of which has its votaries. The rivalry regarding the mountains, may very possibly have arisen from the claim of either to be the birth-place of the god Rám or Bacchus.

In addition to the shrine at the summit of Mt. Elum, there are two others at the roots of the mountain in Boonair, the one called the shrine of the Pir Baba, or the sainted father, the other the shrine of Baba Dewana, or the mad father. They are frequented by both Hindoos and Moosulmauns.

The Muhummadans when they want rain, fire matchlocks at the shrine of Baba Dewana, to compel him to give it them.

The Hindoos visit the throne of Rám in the spring and in the autumn, with shouts and wild gestures. There is no wine in Boonair.

The grape grows at a few shrines and villages, but is not of a fine kind.

The soil of Boonair is red.

The river Burrendoo called also the Rám Tukht River, flows down the valley, in length about forty-five miles. It is generally about knee-deep, but when the snow is melting, fordable only at particular points.

Bacchus received his name of Bromios, from Bremmo to groan or murmur. The valley is called Boonnair, says tradition, from Boonn who first peopled it. Boonnair may be a corruption of Broomair, and Berendoo may be derived from *βρεμω* to murmur (the murmur-er). It has a bed of pebbles.

On this river are situated Elye, a town of 1,500 houses, on left bank of the river about two miles from Lyeia inhabited by Harharzyes or Munsoors and Salars.

Two miles from left bank of river Burrindoo is the old site of a town called in Boonair Lussa, in Sohaut Loosa and Lusa, quasi

Nusa. It is now almost deserted; but may formerly have had 800 houses and a fort of stone and mortar. The site is a natural terrace, ascended by steps of stone. It is one march above the bifurcation of the Berrindoo.

Lyeah, two miles westward of the right bank of the Berrindoo. It is now deserted, but was formerly a town of about 1,500 houses with a fort of masonry. This site is at the roots of Mt. Doserra; Lyeah, I need scarcely observe, was one of the prominent names of Bacchus.

About three and a half miles westward of Elye is the site of a village now nearly deserted, called Awaun; quasi, Evan, one of Bacchus' names. The name of Awaun is common in the N. Western parts of the Punjaub, to many villages the property of members of the Awaun* tribe. But this village belongs to the Tariki tribe, and has only two or three houses of Awauns. It may therefore possibly be a corruption of the name Evan.

In most villages and towns of Boonair, but not in Sohaut, are a few houses of a race called Nusa, who are not Pathans and will not give a daughter to a Pathan (generally the highest race in those parts) although they are Moosulmans. They intermarry only with another race called Baboo Lee who are not Pathans.

The Boa Constrictor abounds in Mt. Elum.

The Satyr or Ourang Outang is confidently asserted to be found in the forest of Mt. Elum. A horrible story is told of a male which carried a woman to the summit of the mountain and was afterwards shot in her company by a wood-cutter.

* The origin of the Awaun tribe is a matter of some interest. Next to the Gukkurs and the Tchibbs (Sibi) the Awauns are the most manly and the finest race in the Sind Sagur Doaba. They call themselves Arabs, desirous like all Muhammadans to deduce their origin from one of three noble stocks, the Pathan, the Arab or Mogul. This origin, however, is disputed and seems very liable to question. They are remarkable for the strength and sturdiness of their frames, which are very different from the spare, athletic, thin flanked figures and spiritual countenances of the Arab race. The Tchibbs, Sibi, with little doubt are descendants of the army of Hercules. The Awanns may prove to have derived their name from Evan or Bacchus, and to be descendants of the colonies left by that prince upon the Indus. They are most numerous in a district bordering the Indus near Ghayb and called Awaunkari.

The existence of this animal in those parts is mentioned by Greek authors; and a belief prevails in Hazara, that it has been seen on Mt. Gundgurlh, where certainly no one would expect to find it. It is called the wild man and supposed by natives to be human.

The wild animals common to lofty mountains of that region are found on Mt. Elum. Tigers and leopards are less numerous than bears. The Boa-constrictor is said never to injure the human species, but to live chiefly upon wild goats, deer, &c. It is probably, I think, the species known to us in India as the rock snake. Of no great length but of disproportionate thickness.

From the above facts, Mt. Elum would appear to offer as favourable a clue as has as yet been found, to the Mt. Meros ascended by Alexander. According to Arrian, Alexander after the siege of Aornos came to the Indus and from thence proceeded throughout the Doaba of the Indus and the river Koopheen, and in this tour came to Nusa, there learnt the position of Mt. Meros and ascended it. The river Indus was at that time swollen by the melting of the snows. The ordinary number of ferry boats would have required many weeks to waft across his army with all its baggage and war-engines, it was obviously better to await the building of fresh boats than to attempt the crossing at once. The tracts conquered were of vast importance, containing the most warlike people he had as yet encountered; and upon the most formidable of all the rivers he was leaving behind him. A tour therefore through this newly subdued country was of considerable utility, and the time spent upon it, was well employed.

Mt. Elum stands as Meros is described by Arrian in the Doaba of the Indus and Koopheen. I can learn of no old site in Sohaut answering to Nusa, and Sohaut having already been conquered, we should not expect to find Nusa there, because according to Arrian the Mulliks of Nusa waited upon Alexander, imploring him to spare their city: and according to Curtius and Plutarch, he attacked and took the city. His former visit to Chumlaif, as I suppose he had visited it after the capture of Aornos, was very hurried; and he may not have penetrated into Boonair, not knowing its history and thinking it too much cut off by mountains to be colonized. It is therefore not impossible that Nusa may have been in Boonair. He

left the city free, but took 300 of their cavalry to swell his army and to serve as hostages.

It may here be worth while to recapitulate all the evidence left by ancient history relating to Nusa and Mt. Meros.

Pliny says, "Other writers are of opinion that the utmost frontier and limit of India is the river Cophetes, and both it and all those quarters are included within the territories or province of the Arii; yea and most of them assume that the cities Nysa as also the mountain Meros consecrated to god Bacchus belong unto India, as parcels thereof. This is that mountain whereof arose the poetical fable, that Bacchus therein was born and issued out of Jupiter his thigh. Likewise they assign and lay to India the country of the Aspagores (Issup and Gowr the inhabitants of Sohant) so plentiful in vines, laurel and box, and generally of all sorts of apple trees and other fruitful trees that grow within Greece." See Holland's Translation, B. VI. ch. 21.

Strabo says, "After the Koopheen flows the Indus (speaking of Alexander's march). Between those two rivers are the Astakoinoi, Maasianoi, Nusaioi and Ippasioi. Then afterwards the (realm) of Assakanos, where is the city Masoga the palace (seat of authority) of the country. Whence over against the Indus, is the territory of another city Peukela, near which the bridge or ferry was established to waft over his army." Strabo, c. XV. p. 698.

In another place Strabo quotes the following passage from Sophocles.

"Thence beholding the insane Nusa illustrious in the sight of mortals, wherein bull-horned Iakkhos dwelleth, to him the most pleasing of nurses. Where not a bird emitteth sound, et cetera.

"And it is said that he was sown up in a thigh and the poet concerning Lycurgus Edonius thus saith:

"He formerly caused trouble to the nurses of the mad or maddening Dionusos at the truly divine Nusa."

Here we see Nusa styled the mad or maddening, and Bacchus receiving the same attribute, agreeing well with the shrine at the foot of Mt. Elum consecrated to the Baba Dewana, or mad father.

Let us sum up the features to be sought for in Nusa and Mt. Meros, and then see how far they will agree with those accompanying Mt. Elum.

Nusa was a city hidden with dense groves, and having tombs of cedar (according to Curtius) in a spot remarkable for the intense chill of the night air in spring. It seems by the same author to have stood in the line of invasion pursued by Alexander. According to Plutarch a river washed its walls, not fordable in the spring. It was a city of such consequence as to be able to afford Alexander 300 horsemen, (see Arrian,) Nusa stood in the Doaba of the Indus and Koopheen according to Arrian.

Mt. Meros was in the neighbourhood, Curtius says that Nusa was under the roots of Meros. Meros was remarkable for groves containing the laurel, ivy, vine, and various fruit trees, and which sheltered the wild beasts of all lands. These shrubs the Nusians boasted were produced only in their mountain, and the Greeks appear not to have met with them in a wild state, in Asia, previously. The mountain was so lofty, that birds did not inhabit it, at least the voice of bird was never heard there. Persons entering the grove were or feigned to be seized with Bacchanallian transports and shouted the names of the presiding deity. E vohe, Iacche, Eleleu: Ues, Attes, Saboi. The mountain was dedicated to the deity, whose commonest epithet was "the insane" so that even the mountain was called the mad Meros.

Rám Tukht, the throne of Rám or Osiris or Bacchus, called by Muhammedans Mt. Elum, is, excepting the Mahabunn, the most remarkable mountain in the Doaba of the Indus and Koopheen. It is pre-eminent, rises like some mighty Pagoda to the height of 9 or 10,000 feet, and is an object of adoration to the Hindu and of reverence to the Muhammadan. It is densely covered with forest, full of wild beasts and is of a height at which, in that part of India, the ivy, box, &c. flourish. At its root is the shrine of the mad father. Both epithets of Bacchus, and below it at the roots are the following old towns* all derivable from the names of Bacchus. Lusa (quasi Nusa from Dionusos), Lyceah (from Luaios), Elye, from the same or possibly from Elios (the sun), Osiris being worshipped as the sun. Awán quasi Eván, Bimeetee quasi Bimeter, a name of

* I could wish for better authority than I possess for the names of some of these towns. It was only as I quitted Hazara, that I discovered the identity of Mt. Elum with the Rám Tukht.

Bacchus, Bókra quasi Boukera, and Keranna quasi Keraunos, a son of Bacchus.

Beneath the town of Lusa flows the river Burrendoo, quasi from *βρεμων*, which is occasionally unfordable during the spring. On the other hand the name Meros if it ever existed, as applied to this mountain, is lost. The mountain does not appear to be in anywise remarkable for producing fruit trees or the animals of all climes; unless indeed the Macedonians limited their list to birds. For no doubt the blackbird, cuckoo and others which we are apt to deem of Europe, are found at different heights upon the mountain. Neither on the mountain Rám Tukht nor upon any of that Doaba does the wild grape ripen. But the wild vine is common. This difficulty however is removed by the following passage from Strabo. "From these (Bacchus and Hercules) a certain people were called Nusaioi, and a city of theirs Nusa the foundation of Bacchus, and a mountain overhanging the city Meros, imputing to them the ivy and the vine (growing) there, but it produces not fruit, for the cluster perishes before it grows colored (ripens) on account of the rain falling on it."

I had hoped to have presented this essay in a much more complete form, but incessant duty prevented me from quitting my post in Hazara even for a day, and my departure has put a stop to farther investigation. Between Hazara, Sohaut and Boonair there is absolutely no intercourse. But could I have visited the western Eusufzye country for even a few days, I might have corrected errors and have obtained far more valuable information of countries unexplored by Europeans since Alexander's visit to them. I hope however, that I have here laid the basis of an enquiry which more fortunate investigators may pursue to certainty.

The main point in demand is the precise site of Massaga. Several travellers have assured me, that they have seen the ruins of a fortified city called Massagorh. But their knowledge of the meaning of charts is so vague, and their answers to questions are given with so little consideration, that it is impossible to feel satisfied of the accuracy of our interpretation of their meaning. If Massaga were in Bajor then Alexander's route according to Arrian is pretty well defined. After conquering Eastern Sohaut, he would have crossed the

Sohaut Sinda (Suastus) above its junction with the Punjgowra, have conquered western Sohaut and have crossed the Punjgowra to besiege Massaga. But Massaga seems to have been a city of the Assakanoi and Gouraioi, and their habitat is north of the Punjgowra river, a little territory only of the Gowr tribe being on the right bank of that river. I therefore still incline to the opinion I have expressed that neither Arrian nor Curtius has recorded the events in the exact order of succession, although I think that Arrian's route is generally to be depended upon.

The construction of a map of Sohaut is a matter of much importance. Sooner or later the Sohauties will compel us to punish them. Every possible means should therefore be applied to add to our knowledge of the features of that rich and extensive valley, and imperfect as is the sketch map now offered, it will yet I trust serve as a foundation for more satisfactory charts, and if so, the toil it has cost me, will be well rewarded.

Appendix to the Gradus ad Aornon.

The following are sites which, with reference to the narrative of Curtius, should not be passed unobserved.

Curtius states that the Macedonians in storming Aornos, were hurled from the mountain crest into the river Indus.

There are but two rocks upon the Indus from which this could have occurred, viz. Pehoor and Kotla.* The latter I have described in a note.

Pehoor is a fortified rock about 100 feet in height and perhaps 200 yards in length by 50 in breadth at base. On the north the east and the west it is a cliff, on the south the ascent is by terraces. The summit has a castle now in ruins of very great strength to resist the attack of a force, unprovided with artillery. At the rise of the river, the rock becomes an island. It commands one of the principal ferries of the Indus and the main road from the Eusufzye to Umb, and other villages on the right border of the Indus.

* The castle of Raja Hodi on the summit of a steep and pointed hill on right bank of Indus has been supposed to represent Aornos. It might possibly suit the description of Curtius, (quicksands excepted), but would not answer to Arrian's description, having neither water nor arable land.

Curtius says of Aornos “*ab altera parte voragine eluviesque præruptæ sunt ; nec alia expugnandi patebat via quam ut replerentur.*” If we are to read either or both of the words *voragine* and *eluvies* as signifying swamps or quicksands, it will be difficult to match the Aornos of Curtius with any site excepting Pehoor. At the season of Alexander’s invasion, when the snows of the mountains were melting, Pehoor must have been isolated by the Indus, which is remarkable for its quicksands.

Curtius had just before described the rock thus “*in metæ maxime modum erecta est : cujus ima spatiosiora sunt, altiora in arctius coeunt, summa in acutum cacumen exsurgunt. Radices ejus Indus amnis subit : præaltus utrimque asperis ripis.*” Viewed from the north, Pehoor has exactly the figure of the Roman goal. The Indus washes its roots on all sides, and the banks of the Indus on either side are still lined with rocky heights.

The ancient site of Baja (Bazira) also is close at hand. And the site of an Oora lies about seven miles to the south near Hoond. The old site of Moosagurhi lies also about seventeen miles to the north-west, and in the same direction are two villages called Tootali (quasi Daedala) inhabited by the Koodoo Khail, and at the distance of about six miles to the south-west are the villages Kál-Durra (quasi Acadera) which are always named together. Pehoor must have been early fortified, being marked out by nature as the site for a castle. A few of the inhabitants of Baja and its neighbourhood might well take refuge in a site so impregnable to armies previous to the invention of cannon.

But on the other hand, Arrian makes no mention of the Indus as washing Aornos. His description of the site is that of an enormous mountain abounding in springs and arable land and forests. If Curtius is to be followed, Arrian must be rejected in toto, as a fabler. Yet his minute and uatural description of Alexander’s Anabasis of Aornos ; of the gradual ascent of a mountain growing steeper as he advanced ; of his battle on the mountain-brow, when with such difficulty he forced his onward way ; of Ptolemy’s cooperation with him by attacking the enemy from the rear ; of his mastery of the moutain summit and regular approaches to the rock :—all these have an air of truth which it is

difficult to resist, and differ essentially from the poetic descriptions of Curtius. Proud as Arrian was of the exploits of a Grecian hero, there is no attempt to exhibit supernatural difficulties. Alexander attacks and carries a strong mountain as a master of the art of war should carry it. He loses men, but they are not hurled from the mountain summit into the swollen torrent of the Indus. The mountain is large and steep, but, so far from being shaped like a cone, 220 horse are led up it and all his war-engines.

The description of Curtius is exactly such, as a man might sit down and imagine to himself as worthy of a rock which had resisted Hercules. And probably in addition to the history of Ptolemy, there may have existed in the time of Curtius many half fabulous narrations of the exploits of the Macedonian hero, which so great a lover of the marvellous as Curtius would prefer to the matter-of-fact statements of Ptolemy, supposing that he could read the Greek of that author.

All the sites described as being near Pehoor, viz. Baja (quasi Bazira), Owra (quasi Oora), Kal-durra (quasi Acadera), are applicable to the site of Mahabunn which is the natural refuge of the people of those old towns.

It has been observed that a camp established at Umb, could have been designed for the attack of no other than Mount Mahabunn or Mt. Behoh. A brief description of the latter may therefore be acceptable.

Mt. Behoh is a peak elevated about 10,000 feet above the sea, occupying the right border of the Indus about twenty miles above Mt. Mahabunn. It forms the Eastern wall of the valley of Boonair, the waters of which, united with those of the Chumla valley under the name of Burrindoo, find passage into the Indus through a cleft of the mountain, south of Mt. Behoh and north of the Mahabunn. I am not aware that the peak of this mountain holds the site of any old castle. But the long high ridge which juts from it to the S. west and which walls the Indus to the height of about 7000 ft. above the sea, is crowned by a remarkable castle of the Hussunzyes called also Behoh. The Hindi name of the Burrindoo river is Wahadri or Ram Tukht ke Nuddie, the latter because it rises in Mt. Elum called also Ram Tukht. The castle of Behoh is certainly

very difficult of access. But it belongs to a district entirely separate and distinct from the Eusufzye where are sited Baja, Kal-durra, Oora, &c. and almost equally distinct and distant from Beejapoor, Owra and Masagorh in western Sohaut. The first march of Alexander's army to attack Mt. Behoh would have brought him to the bank of the Burrindoo. The transit of this stream near the Indus, which must have been performed on rafts of inflated hides, would have occupied two days. But in Arrian's very particular itinerary of this expedition, no river is mentioned, nor, supposing the river to have been forgotten, is sufficient time for the passage allowed. Mt. Behoh has no name like that of the Mahabunn as a place of refuge, being too remote from the plains where invaders are to be feared.

In Sohaut.

Of forts sited on hills, we have the following in Sohaut :

Woorna easily convertible into Aornos, the ruins of a town westward of Ranikote on a hill about 600 feet high. It has not been a strong place. It has two springs of water.

Nawagye is thus described to me by a man who was long a prisoner in it. It stands upon a mountain about 1500 feet high (two and half hours' ascent) belongs to the Momunds.

Is sited near the declivity of the mountain. But has on the other side a small plain. No river is near it. The mountains approach it on three sides. It is an insignificant place of no strength.

Mayar is a large town on the right bank of the Punjgowra river about seventy miles above Tungi. It stands upon a mountain about 1500 feet high. But very easy of access and covered with soil. It is upon the boundary of Bajore and belongs to a Syud.

Maragowr is between Thanna and Birikot on a woody mountain. It has water. This place is said to have sustained a siege of forty years, and to have been taken owing to a quarrel between the chief and his daughter. It has four bastions of masonry separated the one from the other. Is now a ruin.

Balimung is the ruin of a fort on a high mountain between Shingurdhar and Galigye. On the western side it has a level plain, on the other three sides precipices.

Oolagraon the ruins of a fort between Manihurr and Tindora, standing on a high hill; tolerably strong.

The reader may choose for himself from amongst these the site of Aornos. For my part I should absolutely require a site upon the Indus. It seems to me the only certain clue we have to Aornos, that it was sited on the right bank of the Indus. If Strabo, Curtius, and Arrian were all mistaken as to this point, we have positively no means of identification.

The valley of Sohaut, Boonair and even part of the Eusufzye and of Hazara are classical ground in Hindi lore. The five Pandoo brothers, Yoodishtira, Bheema, Urjoona, Nukoola and Saho Deva, with their common wife the beautiful Diroopdi, came to Punjpir (near Zayda) when Yoodishtira, having gambled away the kingdom of Delhi, was obliged by his compact to retire to the jungles. The kingdom of Raja Virah was Sohaut. His capital Virikot or Birikot on left bank of Sohaut Sinde. The Pandoos determining to conceal their dignity and take service as menials with Raja Virah hung up their arms carefully concealed in a spot still called Pandoo Tahn. Peshawur then called Gundhawa was, it will be remembered, the kingdom of Krishna who eventually aided the Pandoos. At Rani da gut is the castle or throne of the beautiful Diroopdi.

Near Birikot is the Summahd or cenotaph of Kirichuk, a monster half Dyte or Titan and half human. He, falling in love with Diroopdi and insulting her, was slain by Bheem Syne the Pandoo.

One koss east of Birikot is the throne of Raja Virah, still called Raja ke Tukht.

Three koss south of Birikot is Kirichuk ke Shuhr, the city of Kirichuk, and between this and Birikot the city of Kirichuk's brother.

Half a koss north of Birikot is Raja Yoodishtira's palace, still so called.

At Galagye is a statue of Kirichuk.

At eleven koss west from Birikot are two mundeers or temples of the Pandoos. Two koss west of Birikot, a temple of Kirichuk.

Seventeen koss N. W. from Birikot is Dyteahpoor now called Dyt Kulli, built by the Dyte or Titan, St'hool, near it in the hill is a vast cavern, doubtless that mentioned by Arrian and Strabo as the cavern of Prometheus the Titan.

Twenty-seven koss N. W. of Birikot is the city of Monama the Titan with a fort. There, on seven hills, stand remains of seven cities and seven bastions, only one of them now inhabited, called Monama Killie.

Eighty koss N. W. from Birikot, is Kirichuk ke Nugr, five koss in circuit on a lofty hill.

Ninety-six miles N. west of Birikot on a lofty hill is Kahun Dyte ke Shuhr.

Eleven koss from Birikot south is Pandoo Koop and Panch Nud, a city.

At Naograon in the Yoosufzye near Rani da Gut is the stable of Raja Virahrt.

In the valley of Chilas inhabited by the Durds (Dardoi) is Bheem Shilla or the stone of Bheem, of the origin of which there is the following tradition. The Pandoos were making the Aswamedha or sacrifice of a horse. The horse released in the wilds for a year was encountered by Raja Chundurhas,* whose duty it was to conquer and lead the horse to the altar. Bheem Syne entered into the horse and said "Why should we strive. Do what I do, and I will own you my superior;" Chundurhas consented. Bheem raised a huge stone from a neighbouring mountain and cast it down in the valley of Chundurhas (Chilas). Chundurhas strove in vain to raise it and there it yet remains. To this day in difficulty men resort to this stone and endeavour to shake it. If it shake, the omen is bad. If it remain firm all is well. It may be conjectured that favourable omens are generally drawn from it.

In addition to these and many other records of the Pandoos, we have the following ancient monuments and sites.

Hodigraon,† the city of that Raja Hodi whose ruined castle crowns the hill confronting Atuk. This city is in Sohaut north of Birikot (see map.)

Beejapoor in Bajor, Raja Mohr Dhuj's city. I cannot ascertain the precise position of this old site, which by one traveller is described as in the Abazy valley. But by Sanskrit books as in Bajore. Mohr Dhuj is said by the latter authorities to have given name to the Koh i Morh Baba or hill of Father Morh.

* Chundurhas, moon grinner, one who grins like the moon.

† Raja Hodi plays an important part in the traditions of the Punjaub.

Kohaut, Raja Juggut's fort.

Trippur, the triple city of Raja Nul, south of Birikot (see map).

Tir Nugr, city of the Raja Tir Bul, north of Birikot about eighty miles.

Maunpoor, city of Raja Maun, four and half miles in circuit from Birikot, 100 m N. west.

Nug and Nugr, cities of Raja Mandatta's Vuzir, 200 miles west of Birikot.

Udli Nugri, city of the said Raja's wife, 240 miles west of Birikot.

Vihung Raja ke Mundur, 50 m N. W. of Birikot, on a hill trans-Sohaut Sinde.

Nutti Nugr, on a lofty hill, 65 m N. W. of Birikot.

Aruktun or water of the sun, an inexhaustible fountain never overflowing. Of Raja Maun's age, 13 miles west of Kahun Nugr.

Jumrood fort in mouth of the Khyber. The place of Raja Juggut.

Kurna, valley of the Kishen Gunga where are the fort and city of Raja Kurn, the gold-maker. His hill is in the Dhoond country.

Rani Kokla's palace, four and half miles of Nowa Shihr Hazara. She was the wife of Raja Russaloo, and being taken in company with her lover was tied by Russaloo to his horse as the balance to the dead body of her lover Raja Hodi and turned adrift. The horse fled from Moorut to the Ghayb country on left bank of Indus below Atuk. There, a Raja of the Chundala or sweeper caste, took her to wife and she became the mother of the Ghayb tribe, one of the most hardy, as soldiers, of all in the Punjaub.

Mt. Moorut, S. west of Rawulpindi, so named from an image of Rani Kokla, which the remorse of Russaloo caused him to set up and which was mutilated a few years ago by the bigotry of a Moolla. It is in a little artificial island at the foot of the hill, close to Russaloo's palace.

Tukht a bun, in Boonair (see map). Fort of Raja Mir Bul.

Bulkot, between Balakot and Gurhi Hubeeb Oolla. Valley of Nynsook river, Hazara. The fort of Raja Bul.

Balakot, same valley, fort of Raja Bala.

Maun Sir now Maunsera, Hazara, fort of Raja Maun, contemporary with Raja Sala Vahana or Salbyne.

*Report on the Dust Whirlwinds of the Punjab. By C. A. GORDON,
Esq. M. D. Surgeon, to Her Majesty's 10th Foot.*

In endeavouring to furnish a report of the storms, typhoons, cyclones, or whirlwinds that have passed over the station of Wuzzeerabad during the period from January to July 1853, both inclusive, I have considered that the distinctive peculiarities of each will be most profitably discussed, if described at the same time that individual storms are noted; such general conclusions as may present themselves from the premises, which will thus in the course of the following observations be developed, being classified and summed up as a sequel to this paper. And I hope the views I adopt regarding the circular current of wind in and general onward motion or track of these storms or cyclones as witnessed in this part of the plains of India will be deemed justified by the nature of the observations from which they have been deduced.

1.—7th January, 1853. The sky had a threatening appearance all day,—prevailing clouds, rain cloud, with well defined lower border, dark cumuli and strato cumuli, at 5 P. M. the wind was N. W. afterwards became S. W. the body of the storm being to the S. The violence of the wind was inconsiderable, heavy rain fell,—thunder, with lightning both sheet and forked,—the former being deep pink and the latter flame-coloured.

It would appear then

a. That the above storm was nothing more than one of rain such as is of frequent occurrence in these provinces, during the cold season.

b. That the circular motion of the wind was from L. to R. or with the wound of a watch.

2.—23rd Jan. 1853. A slight storm is noted as having occurred at 10 P. M. but no observation in reference to it is made, further than that for several nights prior to its occurrence, a large halo was observed round the moon, interrupted towards the N. and that the storm was followed by weather of great coldness.

3.—3rd Feb. 1853. For four days, there had been an increase of nearly 10° in the temperature. On the early morning of this

date, a storm of much rain and wind of considerable violence occurred, but no observation was made till 7 A. M. at which hour the wind was at E., the atmosphere dark and hazy in every direction, clouds, cirri and cirro strati, pointing in no definite direction. The wind continued at E. till 2 P. M. when the storm passed over, and could be distinctly seen proceeding direct N. and occupying about $\frac{1}{3}$ the circumference of the horizon.

It would appear that in this storm

a. The circular motion of the wind was from L. to R. or with the hands of a watch.

b. That in all probability the storm formed over the station, and did not acquire its progressive motion northward until towards 2 P. M. shortly before it passed away in that direction.

c. That this was also one of the cold weather falls of rain, common in upper India.

4.—11th Feb. 1853. During the morning the sky presented a confused appearance, (I know no better expression to make use of.) It was almost entirely overspread by strati and cirri variously modified. Towards N. W.—N. and N. E.; the streaks of these clouds were irregularly blended and curved,—the curves being in no definite direction.

Shortly after mid-day the wind, which had been blowing moderately from N. E., increased much in violence,—carrying with it clouds of dust. It was unattended by thunder or lightning. It thus continued with temporary variations in intensity till about 5, 30 P. M.

During this time the direction of the wind did not vary, nor did any rain fall until about 5 P. M. and then, only a few drops. In the evening a dark cloud was observed at a great distance resting on the horizon E. and N. E.

It would appear that in this slight storm

a. There was no circular motion of the wind.

5.—7th March, 1853. The sky during the previous day was cloudy and *threatening*. Towards sunset a dense mass of black cloud arose from the horizon and gradually extended over the sky. About 7 P. M. of that day the whole of the firmament was hidden by a veil of cloud; the horizon only being observed clear and bespangled with stars. Lightning was observed S. W. and W. with thunder

in the former direction. A few drops of rain fell at 7.30 (of 6th) the wind at that time being S. W. Towards morning the violence of the thunder increased and a storm of wind and rain was audible. The early part of the 7th was still cloudy, occasional puffs of dust swept past,—and in various directions revolving pillars of sand indicated the presence of whirlwinds of small size at different parts of the surrounding plain.

The wind at 9 A. M. of the 7th was N. by E. and at noon E. by S. having gradually veered to that point by N. E. About 2 P. M. the sky at S. E. was very hazy as if portending rain and wind. A small cyclone soon afterwards made its appearance and passed over our house, taking a direction in its onward course or track of N. E., the wind at the same time blowing from S. E. As the body of the storm advanced from the station, it was seen first to curve gently to W. but in a few minutes appeared to be broken up. The wind during the remainder of the evening continued at S. E. the atmosphere was clear,—and several slight squalls continued to come on at intervals.

This storm appears to be interesting on account of the meteorological appearances that accompanied it. From the position of its body as compared with the wind point, it appears evident that

a. The circular current of air was from L. to R. or with the hands of a watch.

6.—12th March, 1853. Since the occurrence of the storm just described the sky had continued dull and cloudy, presenting all the indications of approaching rain. During the day (of the 12th) there were occasional gusts of wind from various and uncertain directions, at the same time that there was more fine sand floating through the atmosphere than could be well accounted for by the slight breezes that prevailed. It was difficult to say what part of the sky presented the most threatening appearance, and towards evening this increased. About 6, 30 P. M. rain began to fall; the shower coming from about S. W. and about 10 to 11 P. M. rain was falling in torrents.

The greater part of this storm having occurred at night, no notes were taken from which to trace the shifting of the wind.

Imperfect as the description of this storm is and although not

calculated to enlighten us, either as regards the circular motion of the wind or the progressive motion of the meteor, it nevertheless is interesting as exhibiting one phenomenon which will be found to be of not unfrequent occurrence, viz.

a. Heavy falls of rain in this part of India are sometimes preceded by a loaded condition of the atmosphere with impalpable dust which could not be accounted for by the amount or force of wind blowing at the time.

7.—13th March, 1853. The sky still continued dark and cloudy. Towards evening very dark clouds arose in the west and W. by N. Much lightning, both sheet and forked, was evident. Towards 8 o'clock the near approach of thunder was audible, but the storm was seen to pass by the station to the N. and E. A slight shower of rain fell.

The above description is also imperfect, but it tends to teach us that,

a. Some storms in this country are so partial and well defined in extent, as to render it a matter of no difficulty to trace their course.

8.—25th March, 1853. The following description of the 8th and 9th, storm observed and registered is taken nearly verbatim from notes written at the time.

In reference to No. 8, it is noted that "the day was cloudy, prevailing clouds strati and cumuli. Hot and sultry,—a very gentle breeze was blowing. About 5 p. m. a diffused haze of dust to the N. W. and N. indicated wind in that direction, and shortly afterwards, a slight increase of wind took place from W. by N.

It only lasted a few minutes, and the dust storm such as it was passed N. of the cantonments and speedily broke up.

9.—26th March, 1853. Hot all day, clear and sunshine, a few cumuli and cirri. About 5 p. m. sky in N. W. became dark, and a few columns of dust were seen in different parts of the darkness. The wind at the time was N. W. and W. by N. but not very strong. The body of the storm like the previous one passed N. of cantonments.

NOTE.—Although there are many reasons for presuming that the two last small storms were circular, in which case the motion of

the wind must have from R. to L. it is nevertheless a matter of considerable difficulty to say positively whether they were true cyclones. It certainly may be that the motion of the wind in them was rectilinear, although from the visible bearing of their mass, the direction of the wind is readily accounted for by supposing them to have been circular. It appears to me that in order properly to ascertain the nature of these and similar land storms, it is absolutely necessary that a cordon of observers be established at various stations, for this purpose.

From the above two slight storms, we readily draw the deduction that,

a. It is at times difficult, if not impossible, for a single observer to decide whether the motion of the wind in certain storms is rectilinear or circular.

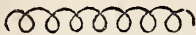
10 and 11.—30th March, 1853. At sunset of 29th, the sky generally was much covered with enmuli and strati, the setting of the sun giving the horizon in the W. a red lurid appearance. The morning of the 30th was hazy; atmosphere close and still, yet a quantity of impalpable dust was suspended in it. About 10 A. M. a sharp breeze occurred from S. and from the darkness to W. and N. at that time, it would appear that the circular motion of the wind was from R. to L. and that the border of the circle only passed over the cantonments. The breeze soon diminished in intensity, but the atmosphere continued hazy, and the temperature was considerably lowered. At 6 P. M. a dark mass of cloud and dust was observed in the N. and N. W. extending to about N. E. It rapidly advanced and then struck our house at N. by E.; varying between this point and N.

It was interesting to observe spiral columns of dust such as are




represented in the margin coming along with and facing part of the body of the storm, the convexity of their course being forward, and the gyrations of the minor currents

of wind of which they seemed to be constituted having a direction from L. to R. and extending upwards from the ground into the atmosphere, and with an onward progress such as would be represented by an imaginary horizontal section near the earth, thus

 only more circular than is here represented. At the conclusion of the cyclone, slight rain fell, and as the storm passed away from the station, the atmosphere was left clear, except towards the west, where the body of it was visible, progressing onwards.

From the above description of this storm several points of interest are deducible, namely—

a. The body of the storm consisted of a number of revolving spiral columns of dust blown by the wind with a circular motion from L. to R. and at the same time gyrating from the earth upwards.

b. The onward motion of the body of the storm was at the station in a general direction from N. E. towards W. but probably with more or less of a curve, or zig zag  which might account for the slight variations in the direction of the wind during the observations.

c. The convexity of the minor gyrating columns of dust being always onwards, would indicate that the chief force of the storm was at an inconsiderable height above the surface of the earth.

12.—9th April, 1853. Although the gusts of wind and dust which occurred during the day cannot properly be included as “storms,” they nevertheless presented a few peculiarities which render them deserving of notice.

The morning was very hot, and the sun very bright. Shortly after mid-day the atmosphere began to become hazy, especially towards the S.: a close and oppressive sensation was complained of. Small whirlwinds carrying up dust were seen in different parts of the plain on which the station is built, and not only was their circular motion different in different individuals, but their onward progress was in different and independent directions, while again in other parts of the plain a column of dust would be observed suddenly to rise from the ground, without any evident circular motion, but with a slight curve at its lower extremity, the convexity being directed forward, thus,



About 3 P. M. the whole sky became obscured and presented a very peculiar appearance: several perpendicular columns of dust such as that represented above, and varying greatly in diameter, although all of nearly equal height were seen approaching from S. E. their upper extremities blending as it were in a dark cloud apparently containing much aqueous vapor as well as suspended dust. At the same time, a mass of dust was seen advancing from N. E. and several smaller columns such as have been noted, were being driven onwards in various directions in our vicinity.

These various columns seemed to break up, and instead of a cyclone coming on, a moderate breeze set in, carrying with it masses of dust. Occasional peals of thunder were heard in various directions, a few drops of rain fell, and about 8 or 9 P. M. the atmosphere cleared up.

It is to be regretted that no proper instruments were available to observe the peculiar conditions upon which the phenomena just described, depended.

It appears that the two days succeeding that on which the above modification of a storm took place were rainy, the wind cold, the Ther. 70° F. in the shade.

One or two points of great meteorological interest may be gathered from the above remarks, viz.

a. Numerous whirlwinds may, under certain circumstances take place simultaneously within a very inconsiderable space; yet with independent motions, both as regards the circular current of wind and onward progress.

b. Currents of wind may be noted at their first commencement in certain cases, by the column of dust they suddenly raise on a dusty plain.

c. These phenomena are attributed to electro-magnetic, or other influences which the want of philosophical instruments renders us unable to detect.

13.—12th April, 1853. Although there were numerous cumuli and strati during the forenoon, the day was nevertheless clear, and the sun at times shone very bright. About 1, 30 P. M. the wind at the time being N. E. a magnificent mass of defined cloud appeared S. W. and soon assumed a distinctly arched form. Films of cloud

Chart I Plate VII

1853

4.



were visible in the latter direction, moving in opposite directions, and the lower border of that forming the arch was illuminated by the sunshine. Thunder was loud and increasing, lightning became vivid, especially in W.: streaks, as if of rain falling were observed in various directions extending downwards from the border of the arch just described. Soon after this, the wind struck our house at W. by N. a very severe storm then came on, and hail stones of considerable size fell thickly. The wind soon veered to W. then to W. by S. and in less than half an hour the sun again shone out, the body of the storm was visible progressing N. E. and contracting in its diameter. A splendid rainbow appeared at its nearest border. (Plate XVII.)

The Chart I. 1853, is intended to represent the progress of this storm. The wind seemed to be from L. to R. the diameter probably 8 or 10 miles, and the onward movement of the cyclone very rapid although the want of apparatus rendered it difficult to say at what actual rate it progressed, we may however presume that, its diameter being 10 miles, and the period of its continuance half an hour, it must have moved onwards at a rate equal to 20 miles per hour.

It may be noted that some of the hail stones that fell during the above storm weighed one rupee. The evening, after the cyclone had passed over, was clear, the atmosphere bracing and cool. On the horizon between S. and E. much lightning was visible, the flashes showing towering masses of thunder cloud in that direction, but no thunder was audible.

It may be further observed, that the temperature was moderated for several days after the occurrence of the above storm.

The following are some of the points of interest that the cyclone just described teach.

- a. That the circular motion of the air was L. to R.
- b. That the diameter of the cyclone underwent modification as it progressed.
- c. That the onward course or track of the storm was more or less elliptical, as indicated by the chart.

14.—20th April, 1853. The early part of the day was cloudy, the sky much obscured by various modifications of strati. Shortly after 4 P. M. the appearance of a dense mass of thunder cloud in

N. E. indicated the existence of a storm in that direction. At 4, 30 P. M. the wind struck with considerable violence at N. as noted in Table II. 1853. At 5, 30, it was at N. E. and before 6, the dust had cleared away, but the outline of the storm could be seen extending a little above the horizon at S. W. or S. W. by S.

About 6½ P. M. a similar storm approached from the same direction, but was very small and of inconsiderable violence; only lasting a few minutes, when it appeared to break up. At the same time, two other partial clouds of dust were observed, one on either side of, but at a little distance from this, but they also soon broke up.

Although in gusts such as have just been described, it is a matter of difficulty to say on all occasions in what direction the wind moves, whether circular, or in direct lines,—we may nevertheless presume that in the one noted in the chart II. 1853, (Plate XVIII.)

a. The motion of the wind was from R. to L. or that which authors describe all storms in the northern hemisphere to have,—we moreover learn that

b. Cyclones at times may be seen to break up or expend themselves.

15.—27th April, 1853. The whole forenoon was hazy, the atmosphere so much obscured by dust as to render it impossible to see to a greater distance than 100 to 150 yards. About 1 P. M. the wind became very strong from S. and between that hour and 4 P. M. gradually veered round by W. to N. at which latter point it ceased about 7, gradually varying, however, a few points E. and W. of North.

From the very obscured state of the sky, it was utterly impossible to say positively from what direction the body of the storm came. It appears tolerably evident that it was circular, and on this supposition the chart III. 1853, (Plate XIX.) has been constructed, the course of the wind and cyclone track being noted in the diagram according to both suppositions, namely, 1st that its motion was from R. to L. and 2nd that it was from L. to R

The above storm must therefore be taken as a very striking example of the fact

a. That it is at times impossible for a single observer to say at the time what is the circular course of wind in a cyclone, and therefore, as a matter of course,

Chart I Plate VII

1853

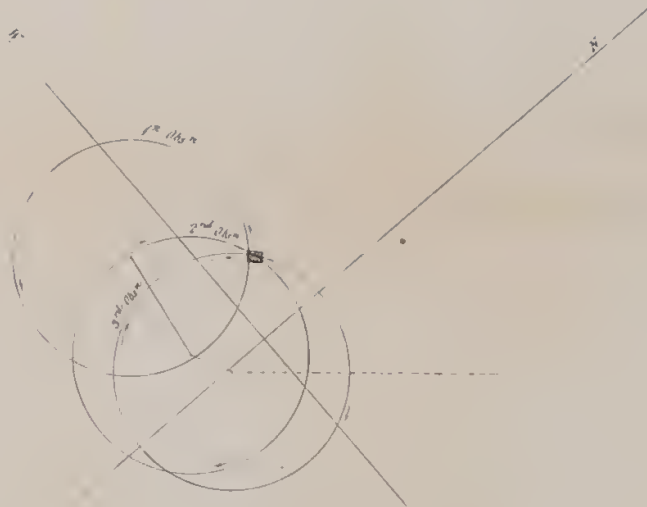


Chart II Plate V III

1853



42 P M 20th April 1853 Wind N

38 S E N E

b. Equally impossible to detect the cyclone track.

16.—10th and 11th May, 1853. Since the occurrence of the last storm described, the temperature continued to range in an open verandah to 104° F. and in the house to 84° and 87° F. the sky being clear: on the 8th some cirri were observable in the W. shortly after sunset, and on the 9th in E. at sunrise. These continued to increase (as they always do in this station for some days before a storm of wind or rain).

On the 10th occasional pillars of dust were seen in various directions, but although extending high and perpendicular, they had no circular motion, their only movement being directly onwards. They first became evident about 4, 30 P. M. and continued till sunset; the heat of the air being very oppressive, no breeze blowing at the time. The evening was intensely dark, especially towards the N.; and during the night high winds continued, but no observations were made.

During the morning and forenoon of the 11th, the same high wind continued from N. E. with occasional drops of rain. Towards the afternoon, the wind increased until at sunset it blew a very stiff breeze, bringing with it clouds of dust, and continuing steady N. E. About 7, 30 P. M. sheet lightning in great quantity appeared S. W. and N. W. and about 9 o'clock rain began to fall in torrents and so continued, the wind all the while not lulling until 3 A. M. of 12th, when the weather cleared up.

In the notes of the above storm, taken at the time, it is stated that "I could not see any thing in the above to induce me to suppose that it was other than a parallel wind from N. E.," and it appears really to have been

a. A rectilinear storm.

It also teaches us that,

b. The columns of dust that precede storms may under certain circumstances have no circular movement.

c. They may occur while there is no perceptible movement of the air even in their mere vicinity.

d. Storms during the hot months are often preceded for several days by the appearance of strati in the West at sunset.

Note.—It appears that during the whole of the 12th, occasional

gusts of wind from various directions prevailed, and at times with rain. In the evening, the horizon seemed encircled by sheet lightning, and heavy rain fell. The 13th was cool, and the early part of the day clear. About 4 p. m. the whole circumference of the horizon became dark, wind came on from W. by N. but no thunder was audible.

The 14th was characterized by irregular gusts of wind, at times carrying along with them masses of dust, but the evening was clear.

The above notes are entered here as showing the description of weather that generally succeeds for a short time the occurrence of storms.

17.—20th May 1853. Since the occurrence of the last storm, the western horizon has continued to present a cloudy appearance every afternoon at sunset; cirri and strati appearing near the earth in the afternoon, but clearing away again during the early night. At 4, 30 p. m. of 20th a heavy cloud of dust of unequal density was seen approaching from S. W., the dust as it were in pillars, with intermediate spaces of comparative clearness. They had not however that appearance of violent agitations that characterizes most cyclones on land, and the summits of the pillars appeared lost in cumulus-like clouds heavily surcharged with dust. The force of the wind was not very violent, nor did the direction of it vary during the hour the storm lasted. The diameter of the cyclone extended from S. E. to W. a few flashes of forked lightning were visible, and a few peals of thunder were heard. As the storm of wind passed over the station in a N. E. direction rain began to fall in torrents and afterwards continued so during the night.

In the notes taken on the spot during the prevalence of the above storm it is stated that "it would seem as if the above cyclone being about to break up, had lost its circular motion* before reaching the

* This is of course merely theoretical, yet, it is quite easy to imagine how such a circumstance might take place. If, for instance, the individual spiral currents, whose existence may be said to be definitely ascertained, were, from a disturbance in the balance of the particular agencies on which they depend, to be for a time more under the influence of those that give such meteors their onward course, than those in obedience to which they are made to revolve on their own axes, the latter motion would be retarded by the former, and would soon altogether cease.

Chart III Plate VII

1853



station, as otherwise it is difficult to imagine how the wind should have continued throughout from one point." At the same time; that it was not a mere parallel current of air from the commencement is presumed from the circumstance of the defined pillars of dust being evident, and unbroken.

By a strange omission, the direction of the wind has been neglected to be stated, but this storm like that previously described teaches that

a. The occurrence of strati in the W. at sunset precedes the occurrence of storms.

18.—*2nd June, 1853.* See chart IV. 1853. (Plate XX.)

The early morning was very hot, with a nearly cloudless sky. At 9, 30 A. M. thunder was heard in W. and it was then observed that a darkness prevailed there, as if rain were falling. At 10, rain began to fall, with a slight breeze from W. The rain after a short time fell in torrents, and the wind increased so much in violence as to destroy some doors and roofs.

In less than fifteen minutes the storm had passed over, and was seen progressing N. E. as represented in the chart.

The original notes of this storm are very meagre, but an examination of the chart teaches us that

a. The circular motion of the wind was from R. to L. or contrary to the hands of a watch, and this conclusion is arrived at by

And indeed, it may not inappropriately be presumed that many cyclones on a large scale break up in this way.

It is well known that the force of the wind on the curve corresponding with the onward track is much stronger than that on the opposite, or curve of retardation, and that this difference in force is occasioned by the onward progress of the cyclone. When therefore we consider that between the various smaller spirals that go to constitute the "storm" there is this tendency to retardation in their circular motion, and that it is increased considerably by the mere friction of the adjoining current, as well as by the circumstance that the adjoining borders of different spirals are revolving in opposite directions, it seems to me that the very circumstance of two combined motions existing, must tend of itself to sooner or later destroy the force and consequent danger arising from these phenomena, and in fact that the more powerful these influences are, the more rapidly is the breaking up of a storm brought about.

noting the wind point at each of the three observations as indicated in the diagram.

b. That the onward course or track of the storm was zig-zag.

19.—16th June, 1853. On 15th, and this forenoon there was a general haze apparently from impalpable dust. Thermometer in the house ranged to 98° F. At 3, 30 p. m., slight thunder was heard overhead, and a dark cloud of dust was perceptible, occupying the horizon from N. E. to N. W. (about half an hour previous, a whirlwind revolving from R. to L. passed over my house, proceeded in a curvilinear direction first N. and then W. to some adjoining houses with which, in coming in contact, it broke up). The storm was not very violent, the wind first came on from S. W. and in about half an hour was blowing from E. Very heavy rain fell, and the sky first cleared up in N. E. the mass of the storm being chiefly progressing to the W.

From the above storm we learn two points, and which, it may be noted are borne out by other observations, the results of which it is not the object of this paper to discuss, namely,

a. A loaded state of the atmosphere from impalpable dust often proceeds the occurrence of a storm.

b. A cyclone is sometimes preceded by whirlwinds of greater or larger dimensions.*

20.—18th June, 1853. According to notes taken at the time I find that the moderation of temperature by which the above storm was followed continued. During the forenoon of the 18th an agreeable breeze continued to blow, but shortly before sunset (it having been S. E.) it ceased, and a bank as if of impalpable sand and cloud appeared on the horizon, extending from N. E. to S. and probably with a diameter of ten miles.

It was evidently concave; the N. E. extremity appearing to be nearer to our house than the S. About $\frac{1}{2}$ past 6 p. m. the dust came up from N. E. as represented in chart VI. 1853, (Plate XXI.) and at the same time the two extremities were distinctly seen approaching each other as the body of the storm progressed. (This approximation of the extremities is endeavoured to be represented in the segment 2

* A chart of this storm was prepared during its prevalence, and marked V. 1853, but in consequence of its inaccuracy, I have omitted it here. C. A. G.

Chart VI. Plate VII

1853



0° P.M. N.E.
1° " " E

18th June 1853

the extremities of which, it will be observed approximate much more closely than those of fig. 1).

My private notes go on to say,—“It appeared therefore that the storm was only commencing its course at this station, that the minor currents whose motion was circular, as shown in the chart have not yet extended so far along the circuit line as to form a complete circle, but were, when observed, in progress to do so.

It also explained the phenomenon of occasional dense columns of dust separated by comparatively clear spaces that are seen in almost every storm, and which is endeavoured to be represented in the sub-joined sketch in which the figures 1, 2, 3, 4 and 5, represent the smaller circular currents the general circuit line of which is represented by large arrows, the figures 6, 7, 8 and 9, indicating the spaces intervening between these currents.

It appears self-evident that as the circumference of two or more adjoining spirals only touch each other at a comparatively small part, such particular point of union must be less obscured by the floating dust and hence, so much more transparent than those parts where large quantities of impalpable sand, &c. are revolving as represented by the small arrows.

The onward course of this storm is represented on the chart by the large arrow. The cyclone was attended by some thunder, but no fall of rain took place, nor was the violence of the wind considerable; and by 8½ P. M. it had passed completely over the station, rendering the temperature very agreeable.

The above storm is one of a very interesting character, presenting various points of dissimilarity from any hitherto observed. Some of the points we gather from it are

a. The minor spirals of a storm may arise together, and attain their onward progress before the whole circumference of such cyclone has been completed by their lateral extension.

b. The circular movement of the atmosphere was from R. to L.

c. The appearance of the storm being much like what is represented in the sketch shows that such are in reality formed of spirals as already adduced.

21.—20th June, 1853. Cumuli and strati had partially covered the sky during the day. At 6 P. M. thunder in the W. was audible,

and then, a dense black rainy-like mass was seen approaching from that direction. The wind first struck from N. E. the rain was heavy and the wind became high. It is to be regretted that no good account was kept during the prevalence of the storm. Latterly the wind blew from N. W. and during the evening, the body of the meteor was visible in the E.

See chart VII. 1853. (Plate XXII.)

From the manner in which the wind veered in the above storm, we may presume that,

a. Its motion was from L. to R.

The following summary of notes refers so far as it extends, more to the prevailing appearance of the sky, and the nature of the weather than to any particular storm. These notes, taken from day to day state that,

“On the evening of 25th June, there was a slight haze in the W. at sunset. The 26th was hot and bright (like the previous day) but the haze in the W. at sunset was greater. On the afternoon of 27th, a thick dust-storm came on (the whole of the forenoon having been hazy). The wind was E. and did not vary considerably while it lasted. On the 28th the sky was more or less hazy, although the sun was bright during a great part of the day. At gun-fire (A. M.) of 29th a dust-storm again came on from the E. and ceased about 5, 30 A. M. The forenoon continued hazy, the wind continuing to blow moderately from the E. till 10½, when it came on from N. but it did not appear that the current of air was otherwise than straight.

Every day up to 5th July, presented the same threatening appearance of rain as is described above, this appearance taking place at different points of the horizon alternately. The sky continued much overcast with cumuli, strati and cirri; and at times there was a tolerably severe puff of wind lasting from 10 to 30 minutes, loaded with dust, and cool.

These “puffs” always appeared to be composed of parallel currents. In the intervals between their occurrence, the atmosphere was close, and gave a sensation of oppression. On the expanse of plain around the cantonments, frequent small whirlwinds were from time to time visible, their track and circular motion appearing to follow no definite direction. It was distinctly evident however that the motion

of the air in these whirlwinds was more rapid on the side corresponding to the onward track than on the opposite.

On 5th July, about 6 A. M. a heavy fall of rain took place from N. by E. attended at first by a good deal of wind. About 9 (A. M.) the shower ceased, the thermometer outside the house (in the shade) being then 78° F. During the remainder of the day, a pleasant breeze continued from E. but without rain.

It ought to be noted here that the prevailing descriptions of cloud were electric cumuli; which were chiefly in S. E. before the occurrence of the fall of rain.

On the morning of 6th July, about 5 o'clock, a heavy fall of rain took place with thunder and lightning, a particular note of this shower was unfortunately not kept, but 2.8 inches of rain were ascertained to have fallen in about 2½ hours, which was the time during which it continued.

After this the weather continued to become gradually less hazy, and the sky less cloudy until the evening of the 10th when sunset occurred with the ordinary clear weather which usually characterises the hot season in the plains.

Note.—Although no distinct “storm” is described in the observations that have just been made, I am nevertheless inclined to hope that they will not be without interest in a meteorological point of view, as being a record of the changes and appearances which generally characterise the hot season.

It will be observed that the number of “storms” of which I have had it in my power to give even a general, and in some instances very imperfect summary, is only twenty-one, and it must be confessed that in more than one of these, the degree of atmospheric perturbation was hardly of that degree which would fully justify the appellation.

From attention to the phenomema presented by even this small number, however, a few interesting points, connected with them may be said to be ascertained, and these may be divided into the following heads.

1st. The line of circular motion, tracks of storms, &c.

2nd. Formation, and general phenomena of storms.

The remarks under each head bearing reference only to these

meteors as observed in the plains, and at a considerable distance from mountains, lakes or seas.

1st.

a. The circular motion of the atmosphere in cyclones may be from L. to R. (in the northern hemisphere) as in Nos. 1, 3, 5, 13 and 21.

b. It may be from R. to L. or contrary to the motion of the hands of a watch, as in 14, 18 and 20, and here I would observe that cyclones having this description of circular motion would appear from my small series of observations to be of less frequent occurrence than those of an opposite character, such as are generally believed to prevail south of the equator.

c. No circular movement of air can be detected in all storms, as 4 and 16.

d. It becomes difficult or even impossible from observations taken in only one locality to say positively, whether the current of air in a storm is rectilinear or circular, or if the latter, in which direction revolving, as 8 and 9, 14 and 15.

e. The onward course or track of a storm may be in a direct line, curvilinear or zig-zag, as in Nos. 10, 11, 13, 14 and 18.

f. The track of a storm cannot under all circumstances be detected (on land) as in No. 15.

2nd.

a. The occurrence of storms in the plains during the hot season is usually proceeded by the appearance of certain phenomena, as strati in the W. 16 and 17, a loaded state of atmosphere from impalpable dust, as 6 and 19. Spiral columns of dust, or whirlwinds revolving and progressing in independent directions, 12.

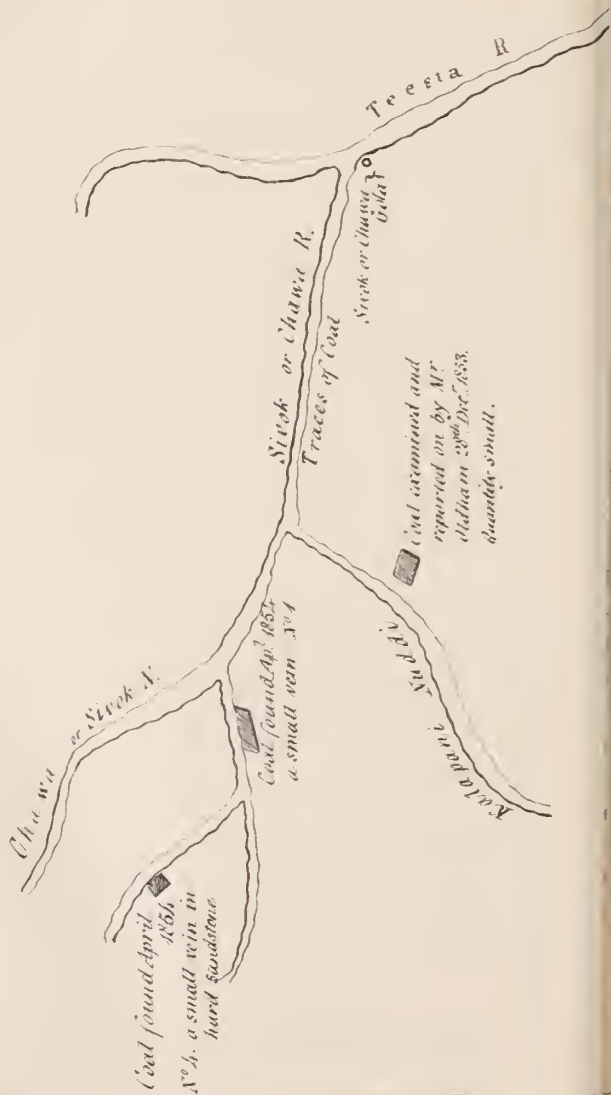
b. They consist of revolving spirals, as shown in Nos. 10, 11 and 20.

c. These spirals may under certain circumstances attain a progressive motion before, by their lateral extension, they have completed the cyclone, as in No. 20. Yet under certain other circumstances, a cyclone may not at its commencement have any onward motion, as No. 3.

d. In some cases it would seem that in storms the greatest force of the wind occurs at inconsiderable heights from the surface of the earth, as in Nos. 10 and 11.

Sketch showing the points at which Coal has been found near the Teesta River
to accompany Mr. Piddington's Report.

(Sig'd) A. Campbell



e. The diameter of cyclones undergoes modifications (under certain circumstances) as they advance.

f. The circular motion is sometimes lost immediately prior to their breaking up, as in No. 17.

g. But in other instances the cyclones break up, or seem to dissolve themselves, without any particular attendant phenomenon, as in No. 14.

Such then are some of the deductions that I have been induced to draw from such observations as I have had an opportunity of making, and I beg now to present them for comparison with those of other observers of this interesting branch of meteorological science.

Examination and Analysis of four specimens of Coal from the neighbourhood of Darjeeling; forwarded by A. CAMPBELL, Esq., Superintendent.—By H. PIDDINGTON, Esq. Curator, Museum Economic Geology.

NO. I. SPLINT COAL.

From the bed of a small stream which falls into the Chawa Nuddee three miles above its junction with the Teesta.

This coal is difficult to describe. In the mass the fracture would be, I think, laminar, dividing into rhomboidal parallelopipeds; the smaller pieces incline to rhomboids, as does the fracture, which may be called hackly and cubical, sometimes very bright and bituminous-looking, and even slightly pavinous in spots; at others with a strong ferruginous tarnish, which on the weathered surface becomes a thin coating of peroxide of iron. On some of the dividing joints and planes the coal is finely striated, and at some of the fractures it assumes the appearance of closely compressed columnar or globular masses as described by me in my report of the month of April, 1853, (Journal, p. 313), on Dr. Campbell's first specimen of coal from Darjeeling.

It does not soil the fingers, and is very brittle, but hard to pound, for it is long before it can be reduced to the state of coarse shining cannon-powder, and requires hard rubbing to reduce it to a fine powder; but even this is not the sooty powder of the bituminous

coals, but still like very finely granulated gunpowder. When this powder is heated in a close crucible, for ascertaining the gaseous contents of the coal, it changes from a shining black to a bright black steely powder.

It flames well in the forceps, but does not melt or alter its shape, remaining a long time red hot till the exterior is a coat of reddish ash; the smoke from the crucible is also highly inflammable.

The smell of the smoke is very peculiar, having nothing pungent or peaty, but being almost aromatic, so as to induce us to suppose that it contains a portion of succinic acid. It barely discolours a silver crucible, shewing thus that it contains no sulphur. Its streak is a dull black.

It is not at all sectile and only crumbles before the knife, differing in this from the former Darjeeling specimen, *Journal Vol. XXII. p. 313* which was a true jet coal.

The ash is a dark fawn-coloured, but very light, powder, from which muriatic acid dissolves a portion of iron, leaving an ash coloured residuum.

There is no effervescence, showing the absence of lime.

It cokes to a bright crumbling cindery mass, of which the fragments incline more perhaps to the cubical than to any other form, but are really of all shapes. The larger pieces preserve their shape a little, though considerably swelled and split, but few will bear more than careful handling.

Its specific gravity is, 1.32.

100 parts of this coal contain :

Water,	6.80.
Gaseous matter,	29.20.
Carbon,	61.10.
Ash,	2.90.

100.00.

The brittleness of this coal and its tendency to absorb moisture, together with the utter friability of the coke, are considerable drawbacks to its economical value. It is in effect from its great purity, readiness to flame, and steady combustion, a very valuable

coal to be used on the spot, but I fear it would suffer heavy waste from breakage, if carried any distance.

No. II.

*Coal from the Mahanuddi.**

The principal lump of this coal sent us reminds one of a section of a flattened stem; and the more so, that its dull exterior is strongly reeded in several parts.

Its fracture may be described as laminar and longitudinally curved in the lamina. In the cross fracture it is a very bright bituminous looking coal, sometimes, like the foregoing, shewing spots and rings like compressed balls of the size of a pea, or jointed columns of the size of a large quill or pencil. It is every where penetrated by stains of oxide of iron, but does not shew on the exterior any strong ferruginous coating like No. I.

It is very brittle and tough, and its streak is a dull brownish black.

Its smoke when burnt is somewhat sickly, mixed with an aromatic flavour which, like No. 1., may be succinic acid. It has no sort of pungency, but it discolours the crucible, though not strongly, so that it may contain a mere trace of sulphur.

It does not soil the fingers, and its powder in the crucible, when the gaseous constituents have been driven off, is not so bright and steely as No. I.

It flames well in the forceps, but does not melt at all. It cokes to a crumbling bright cinder.

Its Specific Gravity is, 1.32.

Its constituents in 100 parts I found to be :

Water,	5.50.
Carbon,	56.40.
Gaseous matter,	33.60.
Ash, of a light fawn colour,	4.20.

99.70.

* Note by Dr. Campbell. This is the largest and most promising vein yet discovered in the Darjeeling territory. Some of the blocks in my possession are a foot square, and the vein where it has been exposed is described as being two feet thick.--A. C.

Like No. I. this coal is a valuable one, on or near the spot, for many, or indeed all purposes; but there would be very heavy loss upon it by carriage. It should however be recollected that these are at all events surface specimens, if not the mere *Top Coal* (or upper beds) of other and tougher veins; for toughness sufficient to render them better able to support carriage, is all that is required to render both these coals equal to the best yet found in India! Their constituents it will be seen approach very closely to the Laboan Coal (36.50 Gaseous; 61.35 Carbou; 2.15 Ash; see Journal, vol. XIX. p. 156); but this last has the appearance and tenacity of Newcastle Coal, which indeed it equals.

Dr. Campbell has not stated to me the exact point on the Mahanuddi at which this coal is found* and I need scarcely say that this Mahanuddi is the river which, rising near Kursiong and running south till it passes about 18 miles to the east of the station of Purneah, curves then to the southeast and passing Plassey and Malda, falls into the Ganges opposite to Bogwangola. How far up it may be navigable will, of course, be an important question in the working of these coals, if the veins are workable ones.†

No. III.

EARTHY SOOT COAL.

This singular substance is certainly a coal, for it contains all the elements of it, but is much like a dark pulverulent Plumbago at first sight; and especially the harder portions, which are, so far as we can judge, from the few bits sent, found interspersed throughout the pulverulent part in flattened lenticular masses. They will be presently described.

The principal part of this coal is a loose sooty black powder, full of glittering fragments, grains, and scales; which soils and adheres excessively to the fingers. I can only compare it to a mixture of lamp-black and a bright glance-coal dust. It feels *both* soft and gritty between the fingers, i. e. it is soft like lamp-black and gritty like coal-dust. It has no sort of resemblance to the Mineral charcoals formed by trap dykes crossing veins of coal.

* It is within the hills and near the source of the river.—A. C.

† The Mahanuddi is navigable all the year round to Doolalgunge, 80 miles from its source: but small boats can ascend to Titalaya, 50 miles higher.—A. C.

This mixture again seems aggregated, rather than hardened, into masses which have just consistence enough to hold together, but which crumble and break with the greatest ease. On the fresh fracture they seem mere aggregations of the harder and softer substances and at times appear laminated, as if deposited by water or assuming a pseudo form of scaly graphite.

The somewhat lenticular masses which form the hard fragments are of a curved and flattened form, but remarkably bright on their external surfaces, which indeed have altogether the appearance of dark coloured graphite, and as some of them write well like black chalk, the illusion is more perfect; they are also sectile, and at times laminar. The cross fracture is a dull black.

I found a fair average of the massive kind of the earthy soot coal to contain in 100 parts—

	Water,.....	10.00		
	Gaseous matter,	9.75		
	Carbon,	39.95		
Earthy Matters. and Iron.	} Silica,.....	28.60	} 40.30	
		Alumina,		4.00
		Iron,		7.70
		<hr/>		
		100.00		

It is thus a very impure, earthy, carbonaceous compound, to which I can find no parallel in any book accessible to me, and thus have distinguished it by the name of Earthy Soot coal, though the Soot coal of England contains, I think, much more gaseous matter. I forbear offering any speculation about it; but it would be curious to know if it becomes a graphite at a greater depth? its per centage of Iron being about that of the graphites, and it is impossible to say what these surface veins are an indication of.

NO. IV.

TEESTA COAL.

From the bed of a small stream to the West of the Chawa Nuddi.

This coal is accompanied by a specimen of the rock in which it is found, which is a compact, light, bluish-grey sandstone, with much white mica in its laminar partings.

It is a very fine-looking massive glance-coal, of a brilliant black, and evidently with a fine conchoidal fracture in the larger masses like the jets. The specimens we have are however for the most part very impure, and so mixed with thick veins and masses of the top sandstone, that it is difficult to pick a good piece for analysis or coking, or for taking the Specific Gravity, which I find to be 1.30.

It is not sectile, but breaks and crumbles under the knife on an edge. Many of the specimens are mixed with a very dark tough shale, which is almost wholly calcareous, though tough enough for a hornblende.

It flames well, and melts a little ; the smell of the smoke is not pungent but rather disagreeable and sickly. It cokes, like Nos. I. and II. into light crackly and brittle masses, but which are of a brilliant shining black, while these last are comparatively quite dull ; its coke is also, though brittle, not so much so as that Nos. I. and II.

I found 100 parts of it to contain

Water,	10.00
Gaseous matter,	30.50
Carbon,	54.75
Ash of a light red colour, principally Iron, with trace of lime and a little silica.	4.75
	<hr/>
	100.00
	<hr/>

A part of the water in all these specimens is no doubt due to the absorption of atmospheric moisture while pulverising, which cannot be avoided in this hot humid weather ; so that this coal is probably even richer than it is here shewn to be by perhaps 5 per cent. in gaseous matter.

As it is, however, if there is only a good supply of it, and in a spot where cheap carriage can be procured, it is undoubtedly a most valuable coal, and in every thing, except its coking, equal to the good English or Welsh coal, and for many purposes the absence of Sulphur may compensate for the brittleness of its coke.

Literary Intelligence.

Defrémery's paper on the reign of the Seldjuk Sultan Barkiarok, 1092—1104 A. D. is concluded in No. 7, (September and October, 1853) of the *Journal Asiatique*. The materials for this contribution to history have been drawn from Arab Authors, and principally from Ibn Djonzy and Ibn Alathir, whose statements are in many places opposed to these of Mirkhond, Khandemir, &c. The 3rd vol. of Weil's *History of the Khalifs*, lately published, has supplied many omissions in Herbelot's article, but it does not give such particulars as are to be found in this notice.

Sédillot reviews the recent translation by Wœpcke* of a treatise by Omarkheiam, a celebrated mathematician and astronomer of the 11th century, who reformed the Persian Calendar by command of the Seldjuk Melikshah. His object is to determine if possible the point up to which the Arabs carried their knowledge of mathematics, a first acquaintance with which science they derived, he thinks rather from the Greeks than from India. However this may be, and though the *Siddhanta* had been translated in the reign of the Caliph Almansor (754 A. D.) it is certain, he says, that the Greek system of Algebra was what prevailed in the schools of Bagdad during the 9th and 10th centuries. W. Bland, in an interesting letter to G. de Tassy, brings evidence to show that Masoud (d. 1130 A. D.) wrote a complete *diwán* of Hindoo guzzals, and to the letter is appended an observation by de Tassy in reply to Dr. Sprenger's doubts as to whether Saadi had ever composed in *Rekhta*. See this *Journ.* Vol. XXI. p. 513. Both these poets, it seems, wrote Arabic verses, and others of their countrymen have written Turkish verses, the latter language, as Mr. Bland points out, standing much in the same relation to Persian as does Urdu.

No. 8, of the same journal (Nov. and Dec.) opens with an extract from an incomplete memoir by Mr. Belin on the origin and consti-

* The Oriental Translation Committee are apparently about to bring out another translation by this author of an interesting commentary on the 10th Book of Euclid, an Arabic MS. of which has lately been found in the Imp. Lib. a Paris.

tution of Wukfs, two decisions by Turkish courts on questions arising out of them being given at length. Then follows a notice by Mr. Renan of a fragment of a gnostic work, bearing the absurd title of the Testament of Adam, and forming a portion of the Syriac fragments in the Vatican Library. The third paper is the continuation of Du Caurroy's '*Législation Sunnite, rite hanéfi*' a series of articles which will now be stopped, the writer having died in November last.

The January No. for 1854, contains the first of a series of three Memoires on the Administrative and Municipal Institutions of China by M. Bazin. There is then an analysis of a very interesting treatise on sword blades, written in our 14th century—*De Hamner*, who is the contributor, draws attention to the comparatively subordinate regard in which the Arabs held the Damascus blade introduced into Europe by the Crusaders.

De Sauley's reading of the Behistoun inscription, prefaced by a few words of explanation of his reasons for differing from Rawlinson, occupies the whole of the February number of this Journal.

The American Oriental Society have published an extra No. of their Journal for the reception of two translations of Tamul works by Mr. Hoisington of Ceylon, and for an article by Mr. Mason of Tavoy headed '*Mulamuli*,' being the abridgment of a volume translated into Talaing from the Shan language, at Labong in 1768, but written originally in Pali. The titles of the Tamul works are '*Tattuva Katṭalei*,' or Law of the Tattuvam, and '*Siva-Gnana-Potham*,' or instructions in the knowledge of God.

A notice appended to this No. announces the rules which have been laid down by the United States Missionaries for the uniform spelling of Armenian and Turkish proper names. The rules have been drawn up by a Committee sitting at Constantinople, and it is much to be hoped, that this example will be followed by orientalists generally.

The long expected memoir on the Scythic version of the Behistan inscription by Mr. Norris, for which the publication of the 1st part of the Journal of the Royal Asiatic Society had been kept back, has made its appearance. Besides facsimiles and transcripts of the inscription with a verbal translation of it, the memoir contains a

verification of the alphabet, a Grammatical sketch with a Vocabulary of the Scythic language. "It is assumed that the language in which the inscription was written, was that of the Nomadic tribes who inhabited the Persian empire; and the memoir sets forth the grounds on which that assumption rests, and which appear to prove that it is allied, grammatically, and to a small extent verbally also, with the so-called Scythic languages, and especially with the Ugrian branch of that class. The interest of the memoir is especially philological, and its great value will consist in the further aid it will probably afford in settling the meaning of some passages in the Persian text, while it may be fairly anticipated that the Assyrian, through which alone we can expect any increase to our acquaintance with the ancient history of man, may receive from these publications additional illustration."

The Annual Report of the same Society read on their 30th Anniversary Meeting in May, 1853, from which the above extract has been made, gives the following interesting intelligence of materials left by the lamented Burnouf.

"The oriental scholar will be very much interested by four large folio volumes, making from two to three thousand pages, containing full indexes to all the Zend words found in the Vendidad Sadi, with the variants of the several editions, forming a complete Zend Dictionary, which will be an invaluable aid to those who are now laboriously endeavouring to get a knowledge of the Zend without it. Several other works on the Zend language and monuments are also found very nearly complete among Burnouf's MSS. Among the Sanscrit papers left, is an index to Panini, containing all the axioms in alphabetical order. This is quite ready for the printer. A Pali Grammar has been also found, nearly complete, and a Pali Dictionary; besides a very considerable mass of MSS., some prepared and completed for the press, and others intended to be so. The list is given in the memoir of M. Barthélemy St. Hilaire, from which chiefly this article is abridged. "Although copious," the writer informs us, "that it does not contain all the valuable remains left by Burnouf."

The Journal of the Bombay Branch (Jan. 1854) is for the most part occupied by Dr. Carter's Summary of the Geology of India.

Another instructive paper by the President Dr. Stevenson on the Cave Inscriptions, Dr. Impey's description of the Koolvee caves, sent to this Society some months back by the author, and a collection of communications from Mr. Frere on antiquities in Scinde complete the No.

No. II. of the *Zeitschrift* of the German Oriental Society has a philological paper by Dr. Hitzig, in which is discussed the origin of the names of three cities in Syria—Mabug, (Hieropolis) Damascus, and Tadmor. Grotefend, whose death has since been announced, explains some of the more modern records in the Babylonian Cuneiform character, and Rükert compares Mohl's edition of the *Shahnameh* with the Calcutta edition. Professor Holtzmann's essay on the 2nd class of Achaemenian Cuneiform writing is continued, after an interval of more than a year, and a translation by Professor Fleischer of an Arabic MS. on the statistics of Damascus completes the original contributions.

From the *Westminster Review* for April we learn that Benfey has published a *Chrestomathia* of Sanskrit works which contains 'an excellent exposition of the laws of Sanskrit metre.' The selection however is entirely from already published texts. Monier Williams' edition of *Sakuntala* is mentioned as being a still more reliable text than Böhtlingk's German edition. The matter of the *Indian Scholia* is given in English notes with frequent translations, and explanations. Mr. Cowell of Oxford has published both text and translation of the *Prākṛita-Prakāsa* of Vararuchi, with the commentary of Bhamaha. Dr. Arnold of Halle has published an Arabic *Chrestomathia* consisting of selections from new and mainly unknown works. Like Kosegarten's it contains a glossary though a less full one. The first *Fasciculus* (there will be six) of Vuller's *Lexicon* is out—its contents are strictly confined to Persian words. Spiegel's *Avesta*, of which the 1st vol. containing the *Vendidad* is published, is said fully to maintain the deserved celebrity of the Imperial Press at Vienna, where new Zend types have been prepared for the work.

Major Cunningham's volume on the Bhilsah Topes which has lately been received from England, works up the mass of materials stored in this journal, and the results of his own and Lieut. Maisey's examination of the Sanchi and its contiguous topes into a connected

and consistent history of Buddhism in India. The work is illustrated by plans of the topes, and of the architectural remains found in and around them, and by drawings of some of the sculptures from the Sanchi gateway. All archæologists will not concur in the author's deductions from, nor perhaps in his readings of, the inscriptions of which fac-similes are published, but all will admit the skill with which he has constructed his history and appreciate the ability with which he has applied the varied knowledge of his subject which he has acquired. The work, it is hoped will be done justice to in Germany, and it will derive additional interest from the publication, shortly expected, of Lieut. Maisey's official report with its illustrations, to the fidelity of which Major C. here bears testimony.

The conjecture given in the chapter on Chronology as to the cause of the discrepancy of 66 years in the dates assigned by the Buddhist and Brahmanical annals to the inauguration of Asoka is at least a plausible one and receives support from the opinion quoted of Mr. Turnour. Major C. thinks that Asoka's conversion may have been taken by the Buddhist, as the date of the true foundation of the Mauryan dynasty. He then proceeds to notice Professor Wilson's objections to the identification of the Priyadarsi of the edicts with Asoka, which in our opinion he successfully refutes, and which may perhaps be now withdrawn, for it cannot be denied that the discovery, in No. 2, Tope at Sanchi, of the relics of the Hemawunta missionaries in the same casket stamps authenticity on the narrative continued in the Mahawanso and Dipawanso.

The chapter on the Gupta dynasty will be read with great interest by Mr. Thomas, who will have, Major C. thinks, to revise his chronology of the Sah kings of Gujrat. The true Gupta æra as derived from all sources is here stated to begin with 319 A. D. The earlier date assigned to it by Mr. Thomas is attributed to the erroneous translation by M. Reinaud of a passage from Aboo Rihan.

The Buddhist origin of the festival of Jugunnath has already been more than once mentioned as probable. Dr. Stevenson, Col. Sykes and Mr. Laidlay have, with more or less reserve, expressed opinions in favour of the supposition, and Major C. now cites the evidence afforded by 'the absolute identity in form of the modern

Jugunnath and his brother Balaráma and sister Subhadrá with the Buddhist monogram or symbol of Dharma.' There is every reason to believe that the annual procession observed by the Buddhists and described by Fa Hiau was adopted by the Brahmans as a ceremony too popular to be then safely suppressed.

Major C. will see that our Society has already made a move in the direction indicated in his Preface. The prosecution of the Sarnath excavations is quite compatible with simultaneous researches on and around the site of Rajagriha.

The same author's vol. on 'Ladak' has also reached our Library. It is a valuable contribution to our knowledge of the physical features of the Western Himalayas which are not to be distinctly gathered from the pages of his fellow-traveller Dr. Thompson. The work moreover as pointed out in the Preface enters into subjects interesting to the antiquary, and contains a comparative vocabulary which will be most welcome to the philologist.

The 1st vol. of the labour of love on which our learned Secretary Dr. Sprenger has been so long engaged was published just before his departure for Egypt. This portion of his 'Catalogue' is devoted to the MSS. of Persian and Hindustani poetry in the Lucnow libraries, but the vol. has been arranged differently from what was originally intended in consequence of the author's failing health. It was commenced too under happier auspices than it was abruptly closed—for the instigator of the undertaking and the constant co-operator with the author, died at the Cape just as its last sheets were passed through the press. It is much to be hoped that the Hon'ble Court will direct the prosecution of the work.

Of the late Sir H. Elliot's great unfinished work, the Society has been presented with a sample just sufficient to show the value of what we have been deprived of. Lady E. has bestowed on the library a copy of the vol. printed at the Cape for private circulation, and alluded to in Dr. Sprenger's List of Sir H.'s MSS. in our last No. The references in this Appendix show the complete conversance of the writer with every thing that had been written on subjects connected with his work—a feature indeed in his published 1st vol. which drew from Fleischer a remark highly flattering to the 'Indian Secretary.' Few orientalists indeed in this country

can, like the late Sir H., keep pace with the progress made in German closets.

The concluding chapter of the appendix is one which we shall perhaps have occasion to notice separately. It is headed 'Indian Voyages and Travels' and is a most valuable contribution to Indian Bibliography.

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR JUNE, 1854.

At a meeting of the Society held on the 7th instant at the usual hour,

The President in the chair.

Read and confirmed the proceedings of the last month.

Donations were received—

1. From the German Oriental Society through Dr. R. Anger, Librarian. *Veteris Testamenti Æthiopici, Tomus primus.*

2. From J. Henry, Esq. Secretary of the Smithsonian Institution. The latest publications of the Academy (for details vide Library Report.)

3. From Capt. Vaughan through Mr. Theobald. A copy of his Grammar of the Pushtoo Language.

4. From Major J. Abbott, Indo-Grecian sculptures from the N. W. Frontier.

Major A. states : “ Those in the large box were dug from the site of a Temple on the left Bank of the Indus, called Kala, close below Ghazi Huzara. The winged female is from another old site at present called Shah ke Tere in Quatur. They are very inferior in grace and execution to those from Trans-Indus; yet they may form the nucleus of a collection of higher order. Those at Kala seem to have belonged to a Boodhist temple of small size, but very richly and elaborately sculptured, the material being black clay-slate. It is a curious fact that all Boodhist remains bordering the Indus, (they are very numerous) bear undoubted evidence of Grecian art. But this was a portion of the most ancient and classic soil of the Boodhist. It was here that Foe left the impression of his foot and the impression of his wet clothes upon a stone. Here he planted the sacred willow. Here he good-naturedly gave his body to save from death a famishing Tiger. Here he used his skin for paper and one of his bones as a pencil.

Note.—This opportunity is taken of publishing a drawing made from a figure which was picked up by a man ploughing in the neighbourhood of Rawulpindee; it probably formed part of a figure in relief and of some building contemporary with that of Jemal-guire. The drawing was exhibited at the April meeting by Mr. E. Bayley. Ed.



Here having listened to half a poem he sacrificed his person and his life. Here Joulai sold himself to his enemy to save from starvation a famishing Brahman. Here Joulai broke one of his bones, the marrow of which was still shown hardened on the rock. Here Joulai hacked his own body for the service of a sparrow-hawk to ransom thereby a dove. Here Joulai resuscitated the corpses of those slain by famine and disease and cured the sick. Here Joulai changed himself into the serpent Souma. Here Joulai, as king of the Peacocks, struck with his beak a copious spring from the rocks. Here the relics of Joulai being carried on a white Elephant, the latter fell and died and was changed into a rock. Here Joulai, piercing his body, gave his blood to nourish the Demons, &c. &c.

“It would be difficult to find a more ancient or revered theatre of Boodhism than this tract, extending from the Jelum to Jullalabad, yet, as I have observed in a late paper, the oldest coins contained in the Boodhistic monuments are of the 1st and 2nd centuries of our era, though a beautiful coinage had there been current in those parts 400 years, and though many of the monuments are attributed to Asoka.”

Mr. H. B. Riddle, C. S. duly proposed and seconded at the last meeting, was balloted for and elected an ordinary member.

The following gentlemen were named for ballot at the next meeting.

Hon'ble E. Drummond, C. S.;—proposed by Mr. Grote and seconded by Dr. A. C. Macrae.

G. F. Edmonstone, Esq. C. S.;—proposed by Mr. Allen and seconded by the President.

Capt. H. C. James 32d, Regt. N. I. proposed by Capt. Thuillier and seconded by Major Baker.

J. Watson, Esq. C. S. proposed by Capt. Layard and seconded by Mr. Grote.

The President then addressed the meeting, mentioning how desirable it was that an effort should be made to obtain the assistance of Government in prosecuting the excavations at Sarnath. He believed that, with the exception of a short interval during which Mr. E. Thomas was at Benares, the excavations had not been touched since the departure of Capt. Kittoe; it had been suggested that, if ap-

plication was made to the Government of the N. W. Provinces, some assistance might be obtained towards completing an undertaking which had been commenced by Major A. Cunningham nearly 20 years ago. The present Lieut.-Governor, lately a V. P. of the Society, had, it was well known, always taken a lively interest in Capt. Kittoe's proceedings, and would be likely to support the Society's movement.

The suggestion of the President was approved and adopted by the meeting.

Communications were received—

1. From the Government of Bengal, through the Under-Secretary Mr. W. G. Young, enclosing copies of correspondence regarding the copper mines of Dhulbhoom. The following is Mr. Ricketts's report on the mines.

Para. 48. "In consequence of what I heard from the principal assistant stationed at Chyebassa, and also from several parties in Calcutta, I penetrated to the copper mines.

49. "Those I visited are situated about eight miles North West from Kalkapoor in Dhulbhoom, and nine miles in the North East from Kessul in Singbhoom. There are traces of considerable diggings in many places, but of very old date. The hills are cleared of jungle, and in the woods below, the heaps of refuse may still be traced. Though the hills in which the ore is found are far in the woods, there are no real difficulties of any kind. Already supplies of the common articles of food may be procured at a short distance, there is a small supply of water near the mines, and it might easily be increased to any amount by throwing drains across some of the valleys close at hand. A good road to Kalkapoor, and to Chunderluka on the Sabenreka river, may be made at but little expense, besides cutting the jungles. The Rajah of Dhulbhoom is quite ready to give speculators a puttah for the lands on reasonable terms. He would give the hills within a circle to be marked out at a very light rent on perpetuity, he receiving a percentage on the produce. He would readily on these terms afford the farmer his assistance in the procuring of people. But no assistance of that sort would be required; good wages would soon bring the hardy labourers of Chota Nagpore.

50. " I have forwarded specimens from the old mines, and also from the new veins, discovered not long ago, where the digging has been carried only six or eight feet from the surface. I am not qualified to give an opinion respecting the value of the ores. Capt. Haughton says ; ' From examination of the ore made by myself, it appears that 24 per cent. of pretty good metal might be safely reckoned on from the Jampore Ore, which much resembles that of Sandoo. Its chief excellence however lies in the softness of the ore, which allows of its being easily worked and in its freedom from sulphur. This last quality greatly simplified the process for the extraction of the metal. All the mines, which appear to be very extensive, require examination and careful analysis by a competent person.

51. " ' I think it might be worth the while of the Government to expend a few thousand rupees in thoroughly testing the produce of these diggings ; should they prove remunerative, doubtless capitalists would immediately come forward to take up the speculation.

" ' Should the veins prove unproductive, still the small outlay will not have been without advantage, if it teaches the people of these parts how to work the richer veins. It would be necessary to enter into an engagement with the Rajah to give him a portion of any produce, and an assurance should be added that the Government would not continue in occupation for above three years, when he might take up the speculation himself, or make an arrangement with others.

52. " ' Though gold is found in the rivers, it does not appear that an attempt has ever been made to endeavour to trace the metal to its bed. As is usual in this part of the world, the rivers rise and run the first miles of their course through thick forests, which are seldom entered by man, and could not be entered, except for a very short period of each year, without great risk ; they are so unhealthy. The discovery of a single nugget of any size would soon induce many of all classes to brave any amount of miasma, but at present, natives are entirely incredulous of the probable existence of beds from which the small grains found in the sand of the rivers are washed, and any search is regarded as visionary and absurd.' "

The Assay Master having examined the specimens forwarded by Mr. Ricketts, reported their metallic contents to be as under :

No. 1,	12 per cent.
„ 2,	a trace
„ 3.	9 per cent.

2. From the Government of the N. W. Provinces, through Mr. Assistant Secretary C. P. Carmichael, forwarding copy of a Meteorological Register kept at the office of the Secretary at Agra, for the month of April, 1854.

3. From Captain Dalton, Debrooghur, noticing the existence of certain ruins near the source of the Seesee river.

The following is an extract from Captain Dalton's letter : " Since I left Debroo I have visited some very interesting ruins of temples in the hills, from which the Seesee river emerges. There is not now an inhabitant within 15 miles of the spot, and a year or two ago the existence of these temples was not known even to the gold-washers, who annually pursued their excavations in the river just beneath them. My attention was directed to them by Major Hannay, who found them out, and removed to Debroo a Doorga that he found there."

4. From Lieutenant Newall, Horse Artillery, through Captain Thuillier, a paper entitled, Sketch of the Muhammadan History of Cashmere.

5. From Dr. Gordon, H. M. 10th Regiment, through Captain Thuillier a paper entitled, a Note on the Topography of Murree.

From Mr. Piddington, Curator of the Museum of Economic Geology, the following papers :

1. A Twenty-third Memoir on the Law of Storms.

2. Examination and Analysis of four specimens of Coal from the neighbourhood of Darjeeling, forwarded by Dr. Campbell.

3. Do. do. of Dr. Campbell's specimens of Copper ores from Darjeeling.

4. Note on the Peat of the Jheels of Bengal.

The Curators and the Librarian submitted their usual monthly reports.

Report of the Curator Museum of Economic Geology.

Geology and Mineralogy.—We have received from Walter Elliott, Esq. Madras C. S. a box of fossil shells and rock specimens, of which he says,—

By the *Paragon*, which sailed some days ago from Coringa, I sent you a box for the Museum of Economic Geology containing some fossils and minerals, from a curious formation about two miles north of Rajahmundry near the village of Kátéru.

The fossils were brought to notice in quarrying some limestone strata for the great works at Dowlaiswaram constructed by Col. Cotton. They consist of shells, which appear to me to be the same as those now found in the sea on this coast, and they occur with the lime under a bed of trap rock over which, where it is covered, lies a quantity of black Cotton soil. The ground slopes from a small hill towards the place where the quarries have been opened about 400 or 500 yards distant, the hill is also trap.

The following is a section of the quarry which was first opened when I visited the place in 1850.

	F. Inches.	
Black soil,	3	0
Trap rock, disintegrating,	5	0
Limestone,	1	0
Clay and gravel,	0	8
Yellow clay and sand,	0	3
Limestone,	1	0
Clay and sand,	0	4
Limestone,	1	0
Clay shale, white, yellow, purple, &c.	2	4
Basalt with zeolites,	14	0

beyond which the excavation was discontinued.

The shells occur immediately below the basalt, generally in indurated mud, often very little changed; in other places a bed of a fibrous mineral like a fibrous limestone* occurs instead of the shells, from 2 to 4 inches thick.

I again visited Kátéru about two months ago, the quarries are now opened much nearer the hill. The limestone bed is thicker and more solid, and the superincumbent basalt of greater thickness also and not covered with soil. The latter is of the same kind as that I have observed in the Dekhan composed of rounded nuclei covered with numerous concentric coatings, which peel off when exposed to the air. The following is a section of the quarry as I saw it on the 13th January.

* Which it is. H. P.

	F.	Inches.	
Basalt,	12	6	Specimens Nos. 1 and 2
Greenish, unctuous, indurated clay, 2	8		3 4
Fibrous limestone,	0	1½	5 6
Highly crystallized limestone,	3	0	7 8
Basalt,	2	0	and probably to a considerable depth.

Total. 20 3½

In another part the series was

I. Basalt

II. Greyish friable clay containing shells, 9 9

III. More compact clay with larger shells, 10

IV. Limestone less highly crystallized.

V. Basalt.

Besides the numbered specimens, I have put a number of others into the box, and one or two pieces of sandstone from the hill at Dowlaiswaram, 4 miles South of Rajahmundry, which also bears the appearance of being of igneous origin. It is of this the Anicut is constructed.

Opposite Rajahmundry an extensive range of low hills occurs in the neighbourhood of Paugady the first dák bungalow on the road to Ellore, the whole of which appears to be of a similar formation to Kátéru, I was told that oyster shells had been found there.

Museum of Economic Geology.—I was applied to by Messrs. Oliva and Co. of Calcutta for information regarding the Peats of Bengal. This information was desired for some French speculators who are manufacturing turf at home and thought of extending their operations to India. Mr. Daly of the House of Correction obliged me with some of the common peat earth of the jheels, which is extensively used for manure all over the country, and some of the same substance coked, which like the Bog-peat of Ireland Mr. Daly has found to be an excellent fuel; and also valuable from its de-odorising properties. Being well acquainted with this substance, I read the substance of my reply to Messrs. Oliva's reference, as it contains many facts which are not generally known and are of interest both in a geological and economical point of view.

“I have had extensive opportunities of being acquainted with this substance, having when a planter, used hundreds, not to say thousands, of tons of it as manure, and dug through thick beds of it down to the bed of the Jheel so as to see it in all its stages.

“The Peat of Europe, it is well known, is formed from the decay of mosses of various kinds* of which the new plants grow on the half decayed beds of the old ones, but our Indian Peat, usually called *Bodh Mattee* in Bengal, is formed by a different process and, mostly, from a single plant the *Oryza sylvestris* or *Ooree Dhan* (wild rice), as it is called by the natives. In some parts of the ancient beds of the rivers or depressions of the soil, which form sometimes broad and extensive lakes, and at others long narrow ones of several miles in length, and which are all called *Jheels* in Bengal, the plant springs up where the soil is favourable to its growth during the early part of the rains, and rising with the water, which it covers with its slender leaves, gives those parts the appearance of a green rice field, though the water may be from 10 to 15 feet in depth. In the month of October when the waters begin to subside, its seed, which is a very sweet, small-grained rice, ripens, and the plant gradually dies and sinks down with the waters, which sometimes leave it dry, forming a deep bog matted over with the stalks of the year's growth. These stalks are cut and dragged out in large quantities by the *ryots*, and being roasted on hurdles over a fire are stacked up for food for their cattle in the dry months, but vast and often thick beds of the peat remain, which have accumulated for centuries from the first formation of the *Jheel*, and in digging through the beds the stems and leaves may be traced in all stages of decay as with the mosses of the bogs. A few other aquatic plants, *Valisneriæ*, *Nymphaæ*, &c. may also be traced amongst them, but as a general rule the greater portion of the peat of the *jheels* is formed from the *Oryza sylvestris*, which appears to flourish on spots which it has appropriated to itself. Near the borders of the Sunderbunds and on the Western shores of the Hooghly, are also found beds of peat which seem to have been formed by the decay of jungle destroyed by inundations or sinkings of the soil, and beds of this are found in all the lower parts of the Delta at variable depths when wells are sunk, or canals or tanks are dug; but these, if thick enough for working as peats, would require a mining process to extract any quantity of them, and it is the surface beds exposed and renewed annually, as I have described above, which afford the manure which is so extensively used by the *ryots*.”

H. P.

The Railway Company having applied to the society for information regarding Iron and Iron ores, which was referred to me by the Council, they were furnished with a complete catalogue of the specimens existing in the museum, with a note on the subject which it may be worth while to put upon record here.

* Principally *Sphagnum palustre*.

*Note with a Catalogue of iron ores, washings, and smeltings ; for the
Railway Company.*

To the following tolerably extensive series of ores, washing and smeltings there is little to be added which has not already been said in Messrs. William's and Oldham's reports ; but we may say with some truth that in India, except in the mere alluvial districts, it is much more difficult to say where iron ore is *not* found than where it is so. This is as regards the mere ore. As regards the other great requisites for the profitable production of manufactured iron, however, fuel and limestone, and carriage to a market, the facts, so far as known to us, are reduced to narrower limits, for except for the finer kinds of ore, and in very profitable situations, it may be doubted if forest fuel, however abundant it may at first be, can either be used profitably, or supplied for manufacturing to any extent worth the risk of establishing large works. The small native works are easily removed from place to place in an iron district, whenever the carriage and other charges of the charcoal become expensive ; and the forest soon grows up again in the abandoned quarters ; and another generation of smelters come back to the old spots where their fathers and grandfathers worked before, to allow *their* exhausted forests to be renewed for their children. With large works this is out of the question, and it might be worth enquiry in such districts as Birbhoom and Bundlécund to know if it would not be more profitable to the European to undertake, not the smelting, but the refining, puddling and rolling processes only ; purchasing the crude iron from the native smelter and trusting to the demand, and, above all, to correct and punctual payments by and from the hands of Europeans, without the intervention of any Sircar or native whatsoever, for an increase of and eventually an abundant supply of the raw material.* Let them but once find that a lot of crude smeltings can be transmuted into silver as readily as a Bank Note can be changed in Calcutta or London, or a rupee into pice and cowries in their own bazars, and I should have little fear of the supply.

So far as an extensive experience of business in the Mofussil both as a planter and manufacturer enables me to judge, I should say that, unless under the most favourable circumstances, all the preliminary operations should be left to the natives, substituting only gradually improved furnaces and the like, if they can be persuaded to adopt them. This as regards the districts where forest fuel is to be depended on. Where coal can be obtained all the conditions of the problem become changed, and iron smelting is then

* No one who has not seen the effect of rigidly excluding Sircars, and even pen, ink and paper from all ready money transactions with native dealers and ryots can imagine the effect of it : I speak from extensive experience.

a process which only Europeans can profitably attempt ; for natives assuredly would not do so, and the questions of limestone and markets must be duly weighed beforehand. Our smelting specimens Nos. 41 to 45 seem to shew that the kunkur can be used as an efficient limestone flux containing as it does from 50 to 80 per cent. of carbonate of lime ; for these were produced in a native smelter's furnace. It should however be tried on a large scale before any thing is based upon it.

(Signed) H. PIDDINGTON,

Cur. Mus. Eco. Geology.

18th March, 1854.

I have also put into the form of a paper for the Journal, the description and analyses of Dr. Campbell's Darjeeling copper ores, of which, though the ores turn out to be poor, and certainly not workable to a profit so far as the mere surface specimens go, it is useful to preserve a distinct record for the guidance of future explorers ; who will learn at once that their business is to set about sinking a good shaft as deep as the native well-sinkers can carry it before they give up their enterprize, for I again repeat that the results of these examinations of ours do not express what the mine or vein is, as miners understand it, but what is found at the surface ; and this is as true of the good results as of the bad ones.

The disappointment then as regards these ores may be but temporary ; but in the mean time I am happy to be able to announce as some compensation for it, that Dr. Campbell's indefatigable and persevering researches in his territories have been rewarded by the discovery of two very good and one excellent (in all three) veins of coal on the Tcesta and Mahanuddi. There is also with them a very singular variety of an earthy Soot Coal which may be an indication of plumbago or of a valuable kind of coal below.

I have put the detailed descriptions and analyses of these coals also into a separate paper, which will well repay perusal by those who are interested in such matters ; briefly, I may state here that No. I. of Dr. Campbell's coal contains only 3 per cent. of ash and is free from sulphur ; but then it is very brittle both as coal and coke, being a true splint coal, and thus would suffer great loss in carriage which is a serious drawback on its value.

No. II. contains $4\frac{1}{4}$ per cent. of ash only but is also, like No. I. very brittle, these two would otherwise be equal to the Laboan and average Newcastle coals, which as to constituent parts they closely approach, but want the cohesion which these last possess.

No. III. is the singular earthy soot coal which I have mentioned above, it contains 40 per cent. of carbonaceous and 40 of earthy matter with only 10 per cent. of gaseous matter.

No. IV. is a first rate Glance-coal, in all respects ; containing $30\frac{1}{2}$ per

cent. of gaseous and $54\frac{3}{4}$ per cent. of carbonaceous matter with only $4\frac{3}{4}$ per cent. of ash and its coke though brittle is by no means so much so as the two first ones, so that altogether and bearing in mind that all we have of these coals are but specimens of the "Top coal," as it is called by the miners, we may hope that this coal, if only abundant, will be equal or superior to any in India.

Dr. Campbell has also forwarded a valuable specimen of Magnetic iron ore from near Punkabarri.

H. PIDDINGTON.

LIBRARY.

The following accessions have been made to the library since the last meeting.

Presented.

Veteris Testamenti Æthiopici Tomus primus, sive Octateuchus Æthiopicus. Edidit Dr. Augustus Dillmann. Lipsiæ, 1853, 4to.—BY THE GERMAN ORIENTAL SOCIETY.

Selections from the Records of Government North Western Provinces, Parts XIII. XIV.—BY THE GOVERNMENT.

Selections from the Public Correspondence of the Punjab Administration, No. VII. 4 copies.—BY THE CHIEF COMMISSIONER OF THE PUNJAB.

Selections from the Records of the Bengal Government, No. XIV. Papers relating to the Establishment of the Presidency College of Bengal.—BY THE GOVERNMENT.

A Grammar of the Pooshtoo Language, by Capt. John L. Vaughan. Calcutta, 1854, 8vo.—BY THE AUTHOR.

Smithsonian Contributions to Knowledge, Vol. V.—BY THE SMITHSONIAN INSTITUTION.

Sixth Annual Report of the Board of Regents of the Smithsonian Institution for the year 1851. Washington, 1852, 8vo. pamphlet.—BY THE SAME.

Portraits of North American Indians, with sketches of Scenery, painted by J. M. Stanley, and deposited with the Smithsonian Institution.—BY THE SAME.

Norton's Literary Register, 1853, 3 copies.—BY THE SAME.

Annals of the Astronomical Observatory of Georgetown College, D. C. No. 1. New York, 1852, 4to.—BY THE SAME.

Maury's Sailing Directions. Washington, 1852, 4to.—BY THE SAME.

Erreurs et Inconsequences des Academiciens François touchant les Auragaus. Par le Dr. Hârc, New York, 1853, 12mo.—BY THE SAME.

Initiatory attempt to define the species of *Hedychium* and settle their synonymy, by Dr. N. Wallich.—BY THE AUTHOR.

Summary of the Geology of India between the Ganges, the Indus and Cape Comorin, by H. J. Carter, Esq.—BY THE AUTHOR.

Indische Studien, von Dr. Albrecht Weber, III. Bandes, Erstes Heft.—BY THE GERMAN ORIENTAL SOCIETY.

The Calcutta Christian Observer, June, 1854.—BY THE EDITORS.

Journal of the Indian Archipelago, June to December, 1853.—BY THE EDITOR.

The Oriental Baptist, No. 90.—BY THE EDITOR.

The Oriental Christian Spectator for May, 1854.—BY THE EDITOR.

The Upadeshak, No. 90.—BY THE EDITOR.

The Tattwabodhiní Patriká, No. 130.—BY THE TATTWABODHINÍ SABHA'.

The Bibidhártha Sangraha, No. 26.—BY THE EDITOR.

The Citizen, for April and May.—BY THE EDITOR.

The Purnachandrodaya, for ditto.—BY THE EDITOR.

The Doorbeen, a Persian Newspaper, Nos. 1 to 6.—BY THE EDITOR.

Exchanged.

The London, Edinburgh, and Dublin Philosophical Magazine, No. 41.

The Athenæum, for February, 1854.

Purchased.

Ritter's Atlas von Asien.

Benfey's Christomathie aus Sanskritwerken, Zweites Theil.

The Annals and Magazine of Natural History, for February and March.

Robertson's Dictionary, English and Guzráti.

Comptes Rendus, Nos. 1 to 8, for 1854.

Cunningham's Bhilsah Topes.

Hooker's Himalayan Journals, 2 vols.

Asar us Sannadeed, 2nd edition, 2 copies.

Journal des Savants, for January and February, 1854.

RA'JENDRALÁL MITTRA.

June 7th, 1854.

FOR JULY, 1854.

At a Meeting of the Society held on the 5th instant at half-past 8 P. M.

Sir James Colville, Kt. President, in the chair.

The minutes of the last month's proceedings were read and confirmed.

Donations were received —

1. From the Government of Madras through Mr. Deputy Secretary J. Low, a report on the Madras Central Museum, for 1853.

2. From Captain Thuillier, a map of the Muttra district, in the Nagri character.

3. From J. Reid, Esq. Officiating Principal, Grant Medical College, a Report of the college, for the session 1853-54.

4. From J. Hill, Esq. an Australian Boomerang.

The following gentlemen duly proposed and seconded at the last meeting were balloted for, and elected ordinary members.

G. F. Edmonstone, Esq. C. S.

Hon'ble E. Drummond, C. S.

James Watson, Esq., C. S.

Captain James, 29th Regt. N. I.

Mr. W. Grapel was named for ballot at the next meeting;—proposed by Mr. Woodrow and seconded by the President.

The Council submitted a proposal, having for its object the nomination, for ballot at the next meeting, of Lieut.-Col. Cautley, F. R. S. F. G. S. as an honorary member.

The President announced to the meeting the death of Professor Jameson, an honorary member, and of Dr. Wallich, an old and distinguished member of the Society.

Communications were received—

1. From W. Muir, Esq. Secretary to the Government, N. W. P. enclosing a copy of the Meteorological Register kept at the Secretariat Office at Agra, for the month of May, 1854.

2. From Bábu Rádánáthi Sikdár, abstracts of Meteorological Register taken at the Surveyor General's Office, Calcutta for the month of March, 1854.

The Secretary read an extract from a letter from Dr. Sprenger, dated Alexandria 3rd June, announcing the discovery of a MS. of the original work of Wáqidy.

"I have met with a work of the veritable Wáqidy: I do not mean Ibn Sád, the Secretary of Wáqidy, who died in 230, but Mohammad b. 'Omar b. Wáqid who was born in 130 and died in 207. Yes, my eyes have seen it and my fingers have touched it, and what is more, I secured it for the Bibliotheca Indica!

"The work is the مغاذي or Military expeditions of the prophet. It has 392 pp. of 19 lines. The copy was written about A. H. 525 or sooner. It belongs to A von Kremer, Dragoman of the Austrian Consulate of Alexandria. He bought it at Damascus, and is anxious to edit it in the Bibliotheca Indica. It is, along with the conquests of Syria, edited by Lees, the most important work in the Arabic literature, infinitely more important than Tabary, being of the first period, and an original work; whereas Tabary is of the second—a compilation and abstract.

"I plead guilty to an error and abjure a heresy into which I have fallen in my life of Mohammad p. 71 note 3. If Ibn Qotabáh and other old authors quote Wáqidy, they mean the veritable Mohammad b. 'Omar, and not his secretary, as there stated.

"As the post will leave this in a quarter of an hour, I cannot give you an outline of the work itself, but the wars of Mohammad appear to be treated in it at three times as great a length as they are in any other known work. He gives us always his authorities and among them, it would appear in some instances written ones, as for instance, Abu Mahsar."

The Librarian submitted his usual monthly report.

LIBRARY.

The following accessions have been made to the Library since the last meeting.

Presented.

Selections from the Records of the Madras Government No. II. Report on the Central Museum.—BY THE MADRAS GOVERNMENT.

Madras Meteorological Observations, 1846—1850.—BY THE SAME.

Natuurkundig Tijdschrift voor Nederlandsch Indië, Deel VI. aflevering I. and II.—BY THE SOCIETY OF NATURALISTS OF NETHERLAND'S INDIA.

Lexicon Geographieum, cui titulus est مرادد الاطلاع بعلى اسماء الامم يمكنه والتغاع Septem Fasciculum, exhibentem leteras ل ad ن.—BY THE CURATORS OF THE ACADEMY OF LEYDEN.

Annual Report of the Grant Medical College, Bombay, 1853-4.—BY THE PRINCIPAL OF THE COLLEGE.

Journal of the Agri-Horticultural Society, Vol. VIII. p. V.—BY THE SOCIETY.

Proceedings of the Royal Society, Vol. VII. Nos. 1-11.

The Caleutta Christian Observer, for July, 1854.—BY THE EDITORS.

The Oriental Christian Spectator, for June, 1854.—BY THE EDITOR.

The Oriental Baptist, No. 81.—BY THE EDITOR.

The Upadeshak, No. 91.—BY THE EDITOR.

The Bibidhārtha Sangraha, No. 27.—BY THE EDITOR.

The Purnachandrodaya, for June, 1854.—BY THE EDITOR.

Exchanged.

The Athenæum, for March, 1854.

The London, Edinburgh, and Dublin Philosophical Magazine, Nos. 44-45.

The Edinburgh New Philosophical Journal, 143.

Purchased.

Atesh Kedah Azo, 1 vol. 4to. Lithograph.

Mutannabbi, 1 vol. 4to.

Masnavi Fedāyi, MS.

The Annals and Magazine of Natural History, for April, 1854.

Comptes Rendus, Nos. 9 to 13.

Journal des Savants, for March, 1854.

RA'JENDRALA'L MITTRA.

July 5th, 1854.

*Abstract of the Results of the Hourly Meteorological Observations
taken at the Surveyor General's Office, Calcutta, in the
month of March, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements
dependent thereon.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Tempe- rature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.846	29.928	29.775	0.153	76.8	88.2	66.0	22.2
2	.780	.867	.683	.184	78.8	87.6	72.8	14.8
3	.814	.904	.752	.152	78.9	89.2	69.9	19.3
4	.838	.913	.785	.128	79.7	90.5	73.9	16.6
5	<i>Sunday.</i>							
6	.826	.894	.765	.129	82.1	94.8	72.9	21.9
7	.813	.890	.759	.131	82.2	92.9	72.9	20.0
8	.868	.969	.787	.182	77.2	85.9	70.4	15.5
9	.889	.969	.824	.145	76.9	87.4	67.2	20.2
10	.927	30.017	.868	.149	74.4	83.6	66.7	16.9
11	.947	.035	.876	.159	73.8	84.8	63.4	21.4
12	<i>Sunday</i>							
13	.814	29.884	.735	.149	80.1	93.6	71.0	22.6
14	.799	.892	.712	.180	82.1	95.6	70.7	24.9
15	.817	.898	.753	.145	81.6	92.6	72.4	20.2
16	.850	.927	.787	.140	81.5	92.5	70.6	21.9
17	.882	.955	.826	.129	81.1	90.1	75.4	14.7
18	.898	.974	.824	.150	80.1	88.4	72.8	15.6
19	<i>Sunday.</i>							
20	.925	.989	.862	.127	80.4	89.2	74.0	15.2
21	.928	30.012	.869	.143	82.3	93.0	74.0	19.0
22	.967	.046	.889	.157	83.3	95.0	74.4	20.6
23	.935	.017	.850	.167	82.0	94.6	73.8	20.8
24	.891	29.977	.816	.161	83.8	96.6	75.6	21.0
25	.886	.978	.810	.168	83.3	94.2	76.2	18.0
26	<i>Sunday.</i>							
27	.889	.969	.799	.170	85.5	95.4	78.8	16.6
28	.849	.923	.758	.165	84.0	91.8	77.4	17.4
29	.802	.892	.661	.231	80.5	92.2	70.7	21.5
30	.809	.880	.700	.180	75.0	87.6	69.0	18.6
31	.855	.928	.796	.132	76.0	85.4	66.9	18.5

*Abstract of the Results of the Hourly Meteorological Observations
taken at the Surveyor General's Office, Calcutta, in the
month of March, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements
dependent thereon.

Date.	Mean Wet Bulb Ther- mometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a cubic foot of air.	Additional weight of Va- pour required for com- plete saturation.	Mean degree of Humi- dity, complete satura- tion being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	70.7	6.1	67.6	9.1	0.677	7.35	2.70	0.755
2	75.9	2.9	74.5	4.4	.842	9.11	1.46	.875
3	73.9	5.0	71.3	7.6	.760	8.22	2.43	.797
4	76.8	2.9	75.3	4.4	.865	9.33	1.54	.873
5	<i>Sunday.</i>							
6	77.9	4.2	75.8	6.3	.879	9.44	2.35	.831
7	75.5	6.7	72.2	10.1	.781	8.38	3.39	.735
8	67.5	9.7	62.6	14.6	.573	6.21	3.83	.634
9	70.0	6.9	66.5	10.4	.651	7.07	2.99	.729
10	67.5	7.0	63.8	10.6	.595	6.49	2.80	.717
11	65.6	8.2	61.3	12.5	.550	5.99	3.19	.675
12	<i>Sunday.</i>							
13	73.0	7.1	69.5	10.7	.715	7.71	3.44	.736
14	74.0	8.1	69.9	12.1	.726	7.81	4.02	.707
15	73.6	8.0	69.6	12.1	.719	7.74	3.82	.707
16	75.1	6.4	71.8	9.7	.774	8.32	3.22	.754
17	77.5	3.6	75.7	5.4	.876	9.43	1.87	.848
18	76.6	3.5	74.8	5.3	.853	9.19	1.79	.850
19	<i>Sunday.</i>							
20	76.7	3.7	74.9	5.6	.851	9.18	1.90	.845
21	76.7	5.6	73.9	8.4	.825	8.86	2.91	.779
22	77.0	6.3	73.8	9.4	.823	8.83	3.34	.760
23	76.7	5.3	74.1	8.0	.831	8.93	2.78	.789
24	79.6	4.2	77.5	6.3	.926	9.92	2.43	.829
25	79.3	4.1	77.2	6.2	.918	9.84	2.29	.832
26	<i>Sunday.</i>							
27	80.7	4.7	78.4	7.1	.951	10.16	2.73	.810
28	79.3	4.7	76.9	7.1	.909	9.74	2.60	.811
29	75.0	5.5	72.2	8.3	.787	8.47	2.72	.772
30	71.2	3.8	69.3	5.7	.715	7.78	1.72	.839
31	71.8	4.2	69.7	6.3	.722	7.85	1.92	.823

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1854.

Hourly Means, &c. of the observations and of the hygrometrical elements dependent thereon. (Continued.)

Hour.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.			
		Max.	Min.	Diff.		Max.	Min.	Diff.	
	Inches.	Inches.	Inches.	Inches.	°	°	°	°	
Mid-night.	} 29.871	29.980	29.772	0.208	75.3	80.2	69.1	11.1	
1		.861	.976	.773	.203	74.6	79.9	68.0	11.9
2		.847	.955	.761	.194	74.0	79.2	67.7	11.5
3		.836	.954	.752	.202	73.6	79.2	66.2	13.0
4		.838	.987	.754	.233	73.0	79.2	65.0	14.2
5		.843	.983	.761	.222	72.6	79.2	64.3	14.9
6		.867	.991	.794	.197	72.3	78.8	63.6	15.2
7		.893	30.028	.814	.214	72.2	79.2	63.4	15.8
8		.919	.015	.834	.181	75.2	81.0	67.5	13.5
9		.937	.033	.849	.184	78.8	84.4	72.9	11.5
10		.942	.045	.847	.198	82.0	87.6	75.9	11.7
11		.932	.036	.846	.190	85.0	90.9	79.2	11.7
Noon.	.905	.009	.803	.206	87.4	93.5	81.3	12.2	
1	.872	29.981	.767	.214	89.3	94.1	82.4	11.7	
2	.838	.949	.727	.222	90.3	94.9	82.8	12.1	
3	.817	.925	.708	.217	90.6	95.8	83.6	12.2	
4	.800	.911	.683	.228	90.2	96.6	83.6	13.0	
5	.795	.889	.661	.228	88.1	94.0	80.8	13.2	
6	.806	.899	.685	.214	84.7	90.8	68.5	22.3	
7	.827	.919	.713	.206	82.1	87.2	69.6	17.6	
8	.853	.944	.735	.209	80.3	84.4	69.0	15.4	
9	.880	.971	.750	.221	78.4	82.6	69.5	13.1	
10	.897	30.046	.781	.265	77.1	82.2	69.0	13.2	
11	.885	29.976	.780	.196	76.0	81.2	69.4	11.8	

*Abstract of the Results of the Hourly Meteorological Observations
taken at the Surveyor General's Office, Calcutta, in the
month of March, 1851.*

Hourly Means, &c. of the observations and of the hygrometrical elements
dependent thereon. (Continued.)

Hour.	Mean Wet Bulb Ther- mometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a cubic foot of air.	Additional weight of Va- pour required for com- plete saturation.	Mean degree of Humi- dity, complete satura- tion being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
Mid- night.	72.5	2.8	71.0	4.2	0.758	8.25	1.17	0.875
1	72.2	2.4	70.9	3.7	.755	8.23	1.01	.889
2	71.8	2.2	70.6	3.4	.749	8.17	0.91	.897
3	71.4	2.2	70.3	3.3	.741	8.09	0.86	.901
4	71.0	2.0	69.9	3.1	.733	8.02	0.80	.906
5	70.7	1.9	69.6	3.0	.727	7.95	0.77	.909
6	70.3	1.9	69.3	3.0	.719	7.87	0.75	.910
7	70.4	1.8	69.5	2.7	.724	7.92	0.69	.916
8	72.3	2.9	70.8	4.4	.757	8.24	1.17	.871
9	74.2	4.6	71.9	6.9	.782	8.45	2.01	.806
10	75.6	6.5	72.3	9.7	.793	8.52	3.01	.738
11	77.1	7.8	73.2	11.8	.815	8.67	3.87	.700
Noon.	78.0	9.4	73.3	14.1	.818	8.69	4.81	.644
1	78.4	10.9	73.0	16.3	.810	8.58	5.69	.602
2	79.0	11.4	73.3	17.0	.821	8.67	6.04	.591
3	79.0	11.6	73.2	17.4	.817	8.63	6.20	.584
4	78.8	11.4	73.1	17.2	.814	8.60	6.07	.589
5	78.1	10.0	73.1	15.0	.814	8.64	5.16	.629
6	77.5	7.2	73.9	10.8	.834	8.91	3.62	.714
7	76.1	5.9	73.2	8.9	.812	8.72	2.84	.757
8	75.3	4.9	72.9	7.4	.804	8.67	2.28	.792
9	74.5	4.0	72.5	6.0	.795	8.60	1.78	.832
10	73.7	3.4	72.0	5.1	.782	8.48	1.47	.852
11	73.0	3.0	71.5	4.6	.769	8.36	1.29	.865

*Abstract of the Results of the Hourly Meteorological Observations
taken at the Surveyor General's Office, Calcutta, in the
month of March, 1854.*

Solar radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
	o	Inc.		
1	135.0	..	S. or N. W. or N. or S. W.	Cloudless.
2	136.4	..	S. W. or S.	Cloudless nearly the whole day.
3	139.0	..	S. or S. W.	Cloudless.
4	143.0	..	S.	Cloudless nearly the whole day.
5	<i>Sunday.</i>			Sunday.
6	141.0	..	S. or W. S. W.	Cloudless nearly the whole day.
7	138.0	..	S. or W.	Cloudless nearly the whole day.
8	137.2	..	S. or N. W. or W.	Cloudless the whole day.
9	135.0	..	S.	Cloudless till 4 A. M. scattered ci afterwards.
10	128.0	0.13	N. or N. W.	Overcast with little rain till 3 A. M. nearly cloudless afterwards.
11	132.0	..	N. or S. W.	Cloudless.
12	<i>Sunday.</i>			Sunday.
13	140.7	..	S. or S. W. or N. W.	Cloudless.
14	145.9	..	S. or S. W. or W.	Cloudless.
15	141.5	..	S. or W. or N. W.	Cloudless.
16	137.0	..	S. or W. or N. E.	Cloudless nearly the whole day.
17	129.9	..	S.	Cloudy.
18	129.7	..	S. E. or E. or S.	Cloudy.
19	<i>Sunday</i>			Sunday.
20	134.0	..	S. E. or S.	Cloudy with lightning at 9 P. M.
21	134.0	..	S. or S. E. or W.	Cloudy till 6 P. M. cloudless afterwards.
22	139.0	..	S. or S. W.	Cloudless till 3 A. M. scattered ci or ci till 9 A. M. cloudless till 6 P. M. overcast afterwards with lightning at 10 P. M.
23	136.9	0.14	S.	Cloudy with lightning at 8 P. M.
24	143.0	..	S.	Cloudless nearly the whole day.
25	144.0	..	S.	Cloudless till 5 P. M. cloudy afterwards and drizzling at 10 P. M.
26	<i>Sunday.</i>			Sunday.
27	144.0	..	S.	Cloudy till 7 A. M. cloudless till 3 P. M. scattered clouds afterwards.
28	134.0	..	S.	Cloudless till 5 A. M. scattered ci till 2 P. M. cloudy afterwards, lightning at 6 P. M. and drizzling at 10 P. M.
29	133.0	..	S. or S. W.	Cloudy with little drizzling till 5 A. M. cloudless till 9 A. M. scattered ci till 4 P. M. cloudy with drizzling and lightning afterwards.
30	134.5	0.22	N. E. or S.	Cloudy.
31	140.0	0.79	N. E. or E. or S. E.	Cloudy.

ci Cirri, ci cumuli, —i strati, ci cirro-cumuli, ci cirro-strati, ci cumulo-strati, ci nimbi.

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of May, 1854.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.319	97.0	97.7	67.0	..	..	S. E.	Clear
2	29.367	97.5	98.0	68.0	..	..	S. W.	Ditto
3	29.409	97.0	98.2	70.0	..	..	E.	Ditto
4	29.363	95.0	96.3	72.2	..	..	W.	Ditto
5	29.347	90.1	91.2	72.9	..	..	E.	Ditto
6	29.335	91.5	91.8	73.0	..	..	E.	✓ scattered in zenith
7	29.353	91.5	91.9	74.0	..	..	N.	Clear
8	29.401	89.8	90.4	75.0	..	..	E.	✓ scattered
9	29.411	85.5	86.1	70.2	..	..	N. W.	✓ scattered
10	29.417	85.2	85.9	67.0	..	..	N. W.	Clear
11	29.447	89.5	90.5	68.0	..	..	N. W.	Ditto
12	29.439	93.0	94.5	70.1	..	..	N. W.	Ditto
13	29.417	95.0	94.6	71.0	..	..	N. W.	✓ all over
14	29.407	96.0	95.2	70.6	..	..	N.	✓ scattered
15	29.389	97.5	98.0	72.3	..	..	N.	Hazy
16	29.415	92.0	93.5	72.1	..	..	N.	✓ scatd. towards S.
17	29.447	92.3	92.3	71.4	..	..	N. W.	Hazy
18	29.477	90.5	92.0	71.0	..	..	N. E.	Clear
19	29.399	96.0	97.0	70.0	..	..	N. W.	Ditto
20	29.385	95.0	96.3	67.0	..	..	N. W.	Ditto
21	29.385	96.5	97.3	69.0	..	..	N. W.	Ditto
22	29.287	101.5	102.9	74.5	..	..	N. W.	Ditto
23	29.220	101.2	102.7	71.7	..	..	N. W.	Ditto
24	29.193	102.0	102.6	70.0	..	..	N. W.	Ditto
25	29.155	104.0	104.5	70.0	..	..	N. W.	Ditto
26	29.091	106.1	106.4	72.2	..	..	N. W.	Ditto
27	29.063	104.5	104.9	72.2	..	..	N. W.	Ditto
28	29.061	104.2	104.8	70.6	..	..	W.	Ditto
29	29.061	104.0	105.4	69.9	..	..	N. W.	Ditto
30	29.103	100.5	100.5	74.0	..	..	N. W.	Ditto
31	29.167	104.2	104.3	72.9	..	..	N. W.	Ditto
Mean.	29.313	96.3	97.0	70.9	..	..		..

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6, at times it is far greater.

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of May, 1854.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.313	99.3	99.0	69.0	..	..	S.	Clear
2	29.349	100.4	100.0	68.0	..	..	N.	Ditto
3	29.389	100.0	99.7	72.5	..	..	E.	Ditto
4	29.347	99.9	99.9	73.3	..	..	W.	Ditto
5	29.339	95.0	95.0	75.0	..	..	W.	Hazy
6	29.315	95.0	95.8	73.0	..	..	E.	✓ scattered
7	29.325	95.5	96.2	75.0	..	..	N.	Clear
8	29.357	94.0	94.1	76.2	..	..	N. W.	Hazy
9	29.331	90.0	90.6	71.4	..	..	N. W.	Clear
10	29.405	91.0	92.3	69.0	..	..	N. W.	Ditto
11	29.425	96.5	96.7	70.0	..	..	N. W.	Ditto
12	29.423	97.0	98.3	71.0	..	..	N. W.	Ditto
13	29.381	97.0	97.4	70.5	..	..	N. W.	✓ all over
14	29.385	97.9	96.7	71.2	..	..	N. E.	✓ scattered
15	29.375	100.5	100.2	75.5	..	..	N. E.	Hazy
16	29.389	97.3	93.9	71.0	..	..	N. W.	✓ very few scattered in zenith
17	29.403	94.0	93.5	74.4	..	..	N. W.	✓ all over
18	29.449	94.5	95.3	72.5	..	..	N. W.	Clear
19	29.381	100.5	101.6	71.5	..	..	N. W.	Ditto
20	29.375	97.9	98.3	67.2	..	..	N. W.	Ditto
21	29.375	98.3	99.1	70.2	..	..	N. W.	Ditto
22	29.263	106.7	107.5	73.0	..	..	N. W.	Ditto
23	29.205	106.5	107.2	72.8	..	..	N. W.	Ditto
24	29.151	106.2	106.9	71.0	..	..	N. W.	Ditto
25	29.133	108.1	109.5	70.0	..	..	N. W.	Ditto
26	29.073	109.0	110.8	74.5	..	..	N. W.	Ditto
27	29.053	109.6	111.0	72.5	..	..	N. W.	Ditto
28	29.055	108.9	109.2	72.0	..	..	W.	Ditto
29	29.057	109.5	109.5	74.0	..	..	N. W.	Ditto
30	29.099	105.5	106.8	75.0	..	..	N. W.	Ditto
31	29.167	107.8	108.3	74.0	..	..	N. W.	Ditto
Mean.	29.293	97.0	100.8	72.1	..	..	..	..

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of May, 1854.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	Rain Gauge.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Ft. 2 In. from the ground.	Direction of the Wind.
1	29.257	102.7	103.0	70.0	102.0	79.0	90.5	Clear	..	N.W.
2	29.285	104.5	99.5	71.0	103.5	82.5	93.0	Ditto	..	N.W.
3	29.297	102.8	102.5	73.0	102.0	84.0	93.0	Ditto	..	N. E.
4	29.273	104.2	104.5	75.0	103.5	83.3	93.4	Ditto	..	N.W.
5	29.273	98.0	98.3	76.2	97.5	80.5	89.0	~ scattered in zenith	..	N. E.
6	29.221	100.6	101.4	76.0	100.2	80.5	90.35	Clear	..	N.W.
7	29.229	101.0	102.0	76.6	98.0	78.0	88.0	Ditto	..	N.W.
8	29.289	98.0	96.6	73.3	96.2	79.2	87.7	~ scattered	..	N.W.
9	29.307	95.0	94.5	73.0	94.0	83.5	88.75	~ all over	..	N.W.
10	29.345	96.1	95.9	69.6	95.0	74.5	84.75	Clear	..	N.W.
11	29.329	97.8	97.8	73.0	97.3	77.5	87.4	Ditto	..	N.W.
12	29.319	103.5	103.9	74.6	103.0	81.7	92.35	Ditto	..	N.W.
13	29.269	100.5	100.0	75.5	99.8	84.0	91.9	~ scattered all over	..	N.W.
14	29.277	101.0	100.6	76.0	100.0	85.0	92.5	~ scattered	..	N. E.
15	29.307	100.3	99.5	73.7	99.0	85.5	92.25	Hazy	..	N.
16	29.293	102.7	103.0	72.5	102.2	78.7	90.45	~ very few scattered in zenith	..	N.W.
17	29.329	97.7	98.0	75.8	97.5	84.5	91.0	Clear	..	W.
18	29.381	103.0	101.5	74.5	101.0	79.0	90.0	Ditto	..	N.W.
19	29.295	105.0	105.0	72.2	104.5	79.0	91.75	Ditto	..	N.W.
20	29.281	105.0	104.5	72.0	104.0	84.5	94.25	Ditto	..	N.W.
21	29.213	105.0	106.0	73.0	106.0	85.0	95.7	Ditto	..	N.W.
22	29.161	110.0	109.9	74.1	109.5	87.0	98.25	Ditto	..	N.W.
23	29.129	110.0	109.5	73.8	109.0	89.0	99.0	Ditto	..	N.W.
24	29.107	110.5	110.0	73.0	109.0	92.4	100.7	Ditto	..	W.
25	29.039	111.8	113.5	74.1	111.5	96.8	103.9	Ditto	..	N.W.
26	28.997	114.5	114.0	73.5	114.0	91.5	102.5	Ditto	..	N.W.
27	28.979	114.5	113.2	75.3	112.7	93.0	102.85	Ditto	..	N.
28	28.997	113.8	113.5	73.2	113.0	91.2	101.1	Ditto	..	W.
29	28.995	114.0	113.5	73.0	112.7	90.5	101.6	Ditto	..	N.W.
30	29.025	112.5	112.5	75.0	111.5	90.0	100.75	Ditto	..	N.W.
31	29.085	112.4	112.4	75.0	111.5	95.8	103.65	Ditto	..	N.W.
Mn.	29.210	104.7	104.5	73.7	103.8	84.7	94.31	..	..	..

